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ABSTRACT

The experience of novice users searching SilverPlatter's ERIC CD-ROM on the Macintosh was studied. Ten students from an introductory master's level course in library and information science were recruited as volunteer subjects. Subjects were asked to complete a search on the ERIC CD-ROM; and data were collected via observations, a think-aloud protocol, and a questionnaire. Data were analyzed to describe and categorize the subjects' experience with the user interface. The standard Macintosh interface as implemented did not win over any users who began with a preference for IBM personal computers or compatibles. Experienced Macintosh users gave the product high marks, but users at all experience levels had problems with the interaction provided. Novice users expressed a need for more direction and clarity, and experienced users looked for a more direct way to conduct searches. The most apparent negative attitudes concerned the error messages provided. Four appendixes are included. Appendix A contains the coded tape transcripts. Appendix B is the interview script. The site software license agreement for the computerized Questionnaire for User Interface Satisfaction is presented in Appendix C, and a breakdown of coded events by searcher is presented in Appendix D. (Contains 23 references.) (SLD)

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The User Interface of ERIC on the Macintosh:
A Qualitative Study of Novice Users

This study examines the experience of novice users when searching SilverPlatter's ERIC CD-ROM on the Macintosh. Ten students from an introductory master's level course in library and information science were recruited as volunteer subjects. Subjects were asked to complete a search on the ERIC CD-ROM, and data was collected via observation, think-aloud protocol, and questionnaire. Data was analyzed to describe and categorize the subjects' experiences with the user interface.

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**The User Interface of ERIC on the Macintosh:
A Qualitative Study of Novice Users**

**A Master's Research Paper submitted to the
Kent State University School of Library and Information Science
in partial fulfillment of the requirements
for the degree Master of Library and Information Science**

by

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May, 1993

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Introduction

Problem Statement

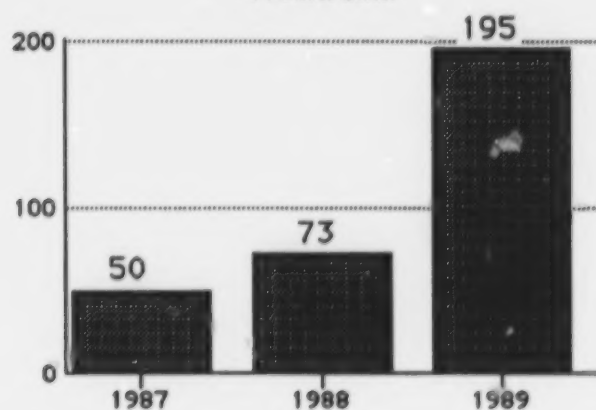
The use of compact disc, read-only-memory (CD-ROM) technology in the 1980s has led to a number of improvements in information retrieval. CD-ROMs are a space saving technology that, with search software, allow fast access to information with a variety of search options (Zink, 1991, p. 16). "Publishers of hard copy didn't worry about how the eventual user would use their product, but for CD-ROM publishers this realization created the concept of user interface" (Helgerson, 1986, p. 71). Shaw (1991) defines the human-computer interface as "what the user sees, hears, and touches in interacting with a computer system" (p. 155). It is this interface that may hinder, frustrate, or prevent the user from achieving a successful search.

Nicholls, Han, Stafford, and Whitridge (1990) consider a CD-ROM product to have three parts: database, retrieval engine, and user interface. They combine the retrieval engine and user interface to define the access software. That software is "largely characterized by variety and rapid change" (pp. 41, 44). Most CD-ROM interfaces were originally designed "to emulate the functions and features of the major online access software," (Herther, 1986, p. 94) but now that hardware has begun to stabilize, the user interface is one of the places that a publisher can distinguish its product in the marketplace. Figure 1 shows the proliferation of distinct retrieval software on CD-ROM products from 1987 to 1989 (Nicholls & Elshout, 1990). "Most of these (67%) are proprietary programs used on a single product only; 79% of all software is used on only one or two

products" (p. 22). CD-ROM technology presents itself as a rich resource for the presentation of text, audio, and graphics, and with the diversity of interfaces that have been spawned, it is time for the industry to turn to quality (Nicholls & Elshout, 1990, p. 22; Shaw, 1991, p. 168).

Figure 1

**Access Software
Proliferation**



Although user satisfaction for CD-ROMs is typically high, studies have shown that training and experience are still required to achieve accurate use of the products. Yet, users feel that they need neither training nor instructions for proper CD-ROM use (Puttapithakporn, 1990, p. 196). An interface designed to address problems of a novice searcher will increase user search success and provide useful information for future product design.

The user interface involves the hardware as well as the software. This combination makes the Apple Macintosh (Mac) an interesting platform to study when used with CD-ROM. Traditionally, the IBM personal computer (PC) relies on a

command line interface and keyboard, while the Mac has defined standards using windows, pull-down menus and a mouse. In designing access software for CD-ROM to run on the Mac, SilverPlatter Vice President Christopher Pooley noted that it was hard to develop and support both platforms for one product, and that there was a question of whether or not the interface for the product should, in fact, be changed from that on the PC. Pooley states that "there are areas where we feel that the Mac standards can't be violated and others where we feel that there is some latitude in terms of integrating features from the users' perspective" (Pemberton, 1989, pp. 20-21).

A new interface was, in fact, created and named MacSPIRS. Although it assumes familiarity with the Mac, its standards, and terminology, the user manual offers the following advice: "we think that MacSPIRS is very easy to use, but we are also aware that people who are not already familiar with information retrieval might need a little assistance to help them start out" (SilverPlatter, 1990, p. 2). The manual presents the basic techniques for information retrieval, functions of the access software, and an explanation of how to access the help features. The documentation of the product, though an important point to be evaluated, is beyond the scope of this study. The "very easy to use" claim, however is one that will be studied, described, and quantified here.

Zink (1991) asks for more critical evaluations of CD-ROM interfaces in the literature to aid in both library collection development and industry awareness of the importance of the

interface. While the data that exists on CD-ROM is usually available in print, it is the powerful search capabilities provided by the access software that provide the major benefit. "The major challenge facing software authors is to make the software designer a skilled communicator, not to make the average person computer literate. As any writer knows, the primary task of any communication falls on the originator" (p. 17). Shneiderman (1987) challenges designers to "go beyond the vague notion of 'user friendliness' and probe deeper than a checklist of subjective guidelines. They must have a thorough understanding of the diverse community of users and the tasks that must be accomplished. Moreover, they must have a deep commitment to serving the users" (p. 9).

It is this combination of interface and user which lends itself to what Mellon (1990) defines as naturalistic inquiry. She states the case as follows:

Naturalistic inquiry is particularly relevant to librarianship. In this age of automation, it is necessary for librarians to keep reminding themselves that theirs is a profession aimed at bringing information to people. It is not enough to develop better methods of storing and retrieving the information: we must remember that the purpose of storage and retrieval is to satisfy the needs of people. And the focus of naturalistic inquiry is people--how and why they think and act as they do. (p.3)

This qualitative study will examine the experience of novice users when using the MacSPIRS interface to search ERIC. Data will be gathered by observation, think-aloud protocol, and questionnaire. Data will be analyzed to describe and categorize the subjects' experiences with the user interface.

Literature Review

"The actual dawn of user interface design first happened when computer designers finally noticed, not just that end users had functioning minds, but that a better understanding of how those minds worked would completely shift the paradigm of interaction" (Kay, 1990, p. 192). In the 1970's the study of human interface began as an art and a science with the development of new types of computer input and output devices (Rheingold, 1985, p. 249). Now interface design is on the minds of computer scientists, psychologists, software designers, and many professionals, including librarians. Shaw (1991) found the following terms in her review of this emerging field: "cognitive engineering, cognitive ergonomics, computer-human interaction/interface (CHI), convivial computing, cooperative interface, human-computer interaction/interface (HCI), person-machine interface, software ergonomics, usability engineering, user friendly/cordial/oriented/centered, and user interface" (pp. 178-9).

The diversity of terms is rivaled by the number of interfaces and theories that exist. Kay (1990) urges designers not to transfer the way we use paper to the software interface, but to create "user illusion" (p. 199). He has involved children from the beginning of his research because he insisted that the interface had to be as easy to understand as it was powerful (Rheingold, 1985, p. 249). Kay (1990) drew from Piaget's theory of children's mental development these three stages: enactive, iconic, and symbolic. Good design should integrate these philosophies--no one alone is "right" (pp. 194-5). The enactive stage is embodied by the use of the mouse, being able to

manipulate by moving and pointing. The iconic stage is represented by the use of images, that is, icons and windows, so that the user can easily recognize functions or ideas. Finally, the symbolic stage is accomplished through the use of object-oriented programming to tie together long chains of reasoning (p. 196). These principles became the standards for the Mac interface which would be carried through to many applications. Kay, however, acknowledged that it would not always be done well. He compared "applying Macintosh style to poorly designed applications and machines" to "putting Bearnaise sauce on a hotdog" (p. 191).

It is the combination of the hardware and software aspects of the interface that make the Mac so interesting to evaluate with respect to the effect on novice searchers of CD-ROMs. The Mac, since its inception, has incorporated a graphical user interface (GUI) and a mouse which are now available on IBM PC's and compatibles via the software product Microsoft Windows. MacSPIRS makes use of the GUI but also draws from other interface styles.

Shaw (1991) describes the GUI as follows:

Some writers have used the playful and slightly pejorative term WIMP to refer to interfaces that use windows, icons, menus/mice, and pointers/pull-down menus. A less partisan term is 'graphic user interfaces' (GUIs). Graphic interfaces that incorporate icons are standard for many microcomputer applications, allowing the user to select a picture of the desired action rather than having to remember specific commands. (p. 160)

This selection is accomplished via the mouse, an indirect control away from the screen surface. It "is attractive because the users can avoid learning commands, reduce the chance of typographic errors

on a keyboard, and keep their attention on the display" (Shneiderman, 1987, p. 237). However, Ziegler and Fahnrich reviewed empirical investigations and found consistent problems for the novice user with mouse manipulation (Shaw, 1991, p. 164). Nonetheless, Percival and Morrow (1989) assert that "increasingly, the new computer literate generation is being weaned on graphical user interfaces (GUIs) and is coming to expect and demand that kind of intuitive ease of use" (p. 266).

Another type of interface employed in MacSPIRS is Menu-Based Natural Language (MBNL). Here, words and phrases are displayed so the user can point to them with the mouse to select them. No typing is necessary, reducing chances for typographical errors, and no special syntax is required (Hendrickson, 1989, p. 217).

"It is generally accepted that a good interface is internally consistent and that consistency among interfaces provides for greater transfer of skills to new applications. Polson cites the Apple Macintosh as an example of a consistent interface for various applications. "...Systems that use consistent interfaces had significant reductions in training time" (Shaw, 1991, p. 158). The reduction in training time may apply, however, only to users who are already familiar with a GUI or a standard Mac software application.

The term "user-friendly" is used to describe an interface that is easy to use. Nicholls, et al. (1990) remind us that "'user-friendliness' depends on who the users are; it does not necessarily mean easy for novices to use. An interface should be appropriate for the people who will be using it" (p. 43). Helgersen (1986) predicts that "user-friendly" will be replaced by "intuitive" to describe software that is

self-explanatory (p. 73). Whatever it may be called, the literature does contain some common characteristics of a good interface.

Zink (1991) gives the following list:

- uncluttered items
- knowledge of audience
- effective use of color, spacing, windowing
- standardization of terminology
- key information in prominent and consistent locations, and
- elimination of lengthy tutorials, documentation or help required to use the system (p. 17).

In the case where different types of users might use a system, a choice of interface may be an appropriate option. The needs of novice users differ from those of expert operators or of occasional, but trained, users. "Novices need simple, logically organized, and well-labeled displays that guide their actions. Expert operators do not need extensive labels on fields; subtle highlighting or positional presentation is sufficient. Display formats must be tested with users for comprehensibility" (Shneiderman, 1987, p. 71).

Shneiderman (1987) describes eight underlying principles of good interface design:

1. Strive for consistency
2. Enable frequent users to use shortcuts
3. Offer informative feedback without confusing error messages
4. Design dialogs to yield closure giving users a sense of accomplishment and indicating the time to prepare their next actions
5. Offer simple error handling, telling the user how to correct the error that occurred, not just that it occurred
6. Permit easy reversal of actions

7. Support internal locus of control: "make users the initiators of actions rather than the responders"
8. Reduce short-term memory load by using the screen to display frequently needed information (pp. 60-62).

From the designers' point of view, it is clear that the first rule is to know the user. In Herther's review (1986) of access software for CD-ROM, the list of user expectations both mirrors some of Shneiderman's suggestions for designers and augments his list with items that are more specifically directed at bibliographic retrieval:

1. Software must be easy to learn and use, even for the novice. Screen displays should be clear and uncluttered and directions straight-forward. User aids and instructions should be clear and meaningful to the end-user.
2. Commands should be clear, simple, and use a minimum of keystrokes.
3. The systems must allow for browsing.
4. Standard Boolean searching should be employed in addition to being able to search on specific fields.
5. If a thesaurus or other guides are available they should be carefully brought into the search process as a clear aid to the searcher and not a distraction or source of confusion.
6. Search results of a bibliographic database should yield a full citation. Any abbreviations used should be clear and meaningful (pp. 93-94).

Shaw (1991) notes that interface design was at first no more than an afterthought. Now that good interface design is regarded as essential to the sale of a product, more attention is being paid to this piece of software and hardware design, but there is no consensus on how to measure it (p. 157). For scientific purposes, it is necessary to transform the vague idea of user-friendly to quantifiable criteria. Shneiderman (1987) provides a list of five measurable human factors for evaluation:

1. time needed to learn
2. speed of performance
3. rate of errors by users
4. subjective satisfaction
5. retention over time (pp. 14-15)

This study will focus on items three and four from Shneiderman's list. Even when quantified into such categories as "How many and what kinds of errors are made in carrying out a particular task," the methods used to collect this data are themselves subjects of study.

Qualitative methods

"Qualitative methods, as well as quantitative methods, have been employed in user studies since the inception of this type of research in the late 1940s" (Mellon, 1990, p. 136). They were criticized because the findings could not be generalized, using such small samples that they could not be representative (Mellon, 1990). But there is a place for these studies.

Qualitative analysis, also referred to as "ethnography, naturalistic inquiry, case studies, fieldwork, field studies, and participant observation" (Ary, Jacobs, and Razavieh, 1990, p. 444), is useful for studying events where the goal is to describe what is happening in context. Patton (1980, pp. 40-41) describes the process as holistic, not just looking at bits and pieces, but at the totality of an event; inductive, going from specific situations to the general; and naturalistic, usually occurring in the field. Fidel (1984) defines the case study method as an attempt to "systematically develop a comprehensive model describing patterns of behavior" and lists three conditions that point to the appropriateness of its use: "(1) a large variety of factors and relationships are included, (2) no basic

laws exist to determine which factors and relationships are important, and (3) when the factors and relationships can be directly observed" (p. 273).

Qualitative methods are particularly valuable when used to evaluate library applications where the presence of technology is meant to enhance the experience of the library user. "It is reasonable to find naturalistic methods filtering into library research through user studies. Library users are human beings whose information needs reflect the complexity of human life" (Mellon, 1990, p. 136). Unlike controlled experimentation, however, the purpose of qualitative study is to describe and understand a naturally occurring phenomenon, not to predict an outcome or control a situation through manipulation of a variable.

This study will make use of three data collection methods, a process referred to as triangulation. Patton (1980, p. 109) defines data triangulation simply as the use of a variety of data sources in a study. Its purpose is to reduce the subjectivity that is inherent in qualitative methods by looking at the same event several ways. "Each data source has strengths and weaknesses. By using a variety of sources and resources, the evaluator-observer can build on the strengths of each type of data collection while minimizing the weaknesses of any single approach" (Patton, 1980, p. 158). The data collection methods used in this study will be observation, think-aloud protocol, and questionnaire. It is hoped that the strengths and weaknesses of each method will combine to reduce bias (Connell, 1991).

The Direct Observation Method

Patton (1980) lists six advantages of direct observation:

1. The evaluator is better able to understand the *context* within which the program operates.
2. The evaluator can directly experience the program as a phenomenon unto itself, thereby making the most of an inductive, discover-oriented approach.
3. The evaluator has the opportunity to see things that may routinely escape conscious awareness among participants and staff.
4. The evaluator may gain access to information that may otherwise be unavailable because participants might be unable or unwilling to talk about it, or even unaware of their own actions to talk about them.
5. The evaluator is permitted to move beyond the selective perceptions of others.
6. The evaluator is permitted to access personal knowledge and direct experience as resources to aid in understanding and interpreting the program being evaluated. (pp. 124-125)

The disadvantage of observation is that people may respond differently to a situation knowing that they are being observed. Also, Patton (1980) concedes, the evaluator may exhibit selective perception, and will observe only a limited sample of total occurrences (p. 158). Mullins (1991) agrees that observation may affect a subject's performance, and notes also that people exhibit emotion differently, thus frustration may be difficult if not impossible to spot (p. 326). Observation in this study was overt, not covert. The observer was discretely within view of the subjects, but the purpose of the study was not disclosed to participants. Subjects knew that they were being observed, but did not know what factors were of interest.

The Think-Aloud Protocol

The think-aloud protocol is a data collection method whereby subjects are asked to engage in their normal pattern of activity, but to verbalize their thoughts as they occur. The only response from the evaluator is to remind the subjects to continue to think aloud should they lapse into silence. This "conversation" is recorded and then transcribed to become a program document. As with observation, the presence of the evaluator, or of the tape recorder, may affect the result. The subjects' thoughts may be incomplete, inaccurate, selective, and highly uneven in quality (Patton, 1980, p. 158). Despite these disadvantages, think-aloud protocol has become a standard technique for qualitative analysis. Meyers and Lytle (1986) have employed think-aloud protocol in their analyses of reading skills. "Think-aloud procedures have the potential to assess strategic learning behaviors used during the actual task, and they have been used frequently for investigations of problem solving skills" (p. 140). Newell and Simon (1972) describe its use in understanding human problem solving:

We employ little experimental design using control groups of the sort so familiar in psychology. Because of the strong history-dependence of the phenomena under study, the focus on the individual, and the fact that much goes on within a single problem solving encounter, experiments of the classical sort are only rarely useful. Instead, it becomes essential to get enough data about each individual subject to identify what information he has and how he is processing it. This method leads, in conjunction with the content orientation, to emphasizing the use of verbal behavior as data, because of its high output rate. Thus, the analysis of verbal protocols is a typical technique for verifying theory, and in fact has become a sort of hall mark of the information processing approach. (p. 12)

The subjects in the study were fitted with a clip-on microphone that allowed them to speak normally during their search session. The tape recorder was in full view, and several participants were asked to pause while the tape was turned over to continue recording. The full transcripts of the subjects' conversation from the use of this protocol is in Appendix A.

The Questionnaire Method

Finally, a questionnaire was used. The Questionnaire for User Interaction Satisfaction (QUIS) was developed by the Human-Computer Interface Laboratory at the University of Maryland specifically to measure satisfaction with the user interface of software (Norman, 1989). The strengths of the questionnaire format are the simplicity of data analysis, the ability to directly compare responses, and the fact that many questions can be asked in a short time. The weaknesses are, though, that the "respondents must fit their experiences and feelings into the researcher's categories; it may be perceived as impersonal, irrelevant, and mechanistic. It can distort what respondents really mean or experienced by so completely limiting their response choices" (Patton, 1980, p. 206). Mullins (1991) notes that in addition to a questionnaire's lack of objectivity, users tend to emphasize the negative (p. 326).

Summary

These three data collection methods complement each other to provide a holistic picture of a novice searcher using a CD-ROM on a Macintosh. Verbalized thoughts and non-verbal actions were combined with answers from response categories to analyze the user's experience with an interface, both software and hardware.

SilverPlatter's offering of ERIC on the Mac presents an interesting opportunity to study the Mac user interface of a CD-ROM bibliographic database.

Research Question

As this research is qualitative, no hypothesis was tested. Instead, the focus is on an in-depth understanding of the particular situation when novice users search the ERIC CD-ROM on the Macintosh. The process is "similar to librarianship itself--organizing knowledge to make it accessible. Naturalistic researchers make sense out of their data by identifying themes, arranging the themes into patterns of behavior, and developing statements to explain the patterns they observe" (Mellon, 1990, p. 69).

The research question, then, is: What is the experience of a novice user when searching SilverPlatter's ERIC CD-ROM on the Macintosh?

Definition of Terms

CD-ROM Product: a software program and/or database that resides on a compact-disc-read-only-memory medium, a high-density storage device capable of integrating text, data, graphics, audio, and video.

Command-line Interface: a type of interaction with computer software requiring the user to input specific words and/or to press specific keys on the keyboard in order for the request to be processed.

ERIC: Educational Resources Information Center, education database funded by the National Institute of Education (NIE) and available in paper, on CD-ROM, and through online services. Contains bibliographic citations from Current Index to Journals in Education (CIJE), Resources in Education (RIE), and Exceptional Child Education Resources (ECER).

GUI: graphic (or graphical) user interface. A type of interaction with computer software comprising

windows, icons, menus, and a pointing device (usually a mouse).

Icon: a graphic representation of a command or process, such as a '?' to represent help or a picture of a house to represent a main menu (or home screen).

Interface: "what the user sees, hears, and touches in interacting with a computer system" (Shaw, 1991, p. 155).

Menu-Based Natural Language: a type of interaction with computer software where words and phrases are displayed so the user can point to them to select them (Hendrickson, 1989, p. 217).

Novice: a category used in this study to indicate the subject's level of experience using a computer. Note that this categorization does not apply to experience searching ERIC. None of the subjects in this study had searched ERIC on the Mac, though some did have experience with ERIC through other sources.

Qualitative Research: a process comprised of describing and categorizing behavior, useful for studying events in context.

Think-aloud Protocol: a data collection method where subjects are asked to engage in their normal pattern of activity, but to verbalize their thoughts as they occur (Patton, 1980, p. 158).

Triangulation: the use of a variety of data sources in order to reduce subjectivity (Patton, 1980, p. 109).

Methods and Results

This study employs qualitative techniques to document the experience of novice users when searching SilverPlatter's ERIC CD-ROM on the Macintosh.

Naturalistic inquiry focuses on in-depth understanding of a single situation, not on results to be generalized to all similar situations. Naturalistic researchers cannot make the broad claim of the quantitative research: "Given this situation, here is what is likely to happen." They must be satisfied to say, "This is the situation in this setting" (Mellon, 1991, p. 18).

Sample

Ten subjects were selected from a group of volunteers from two sections of a Foundations of Librarianship course at Kent State University's Columbus extension program. This is a nonprobability, purposive sample where this class is judged to be typical (Ary, et al., p. 177). The small sample size is typical of qualitative studies where a large volume of data will be generated and findings should not be generalized.

The only requirement met by the volunteers was no previous experience searching the ERIC CD-ROM on the Macintosh. A profile of subjects was obtained via questionnaire as detailed in Tables 1-6. Most of the subjects were female, and the average age was 33. Four subjects classified their experience with computers as casual, and four as experienced, with novice and expert categories claimed by one each. Six subjects indicated a preference for IBM or compatible personal computers, three for Macintosh. One subject had no preference. Only one subject had no searching experience, eight had searched online public access catalogs (OPACs), while seven had

searching experience with CD-ROM. Five had searched DIALOG or another search service. Table 1 details subjects' experience with devices, hardware and software. Notably, two subjects had no experience with a mouse, and four subjects had never used a Macintosh.

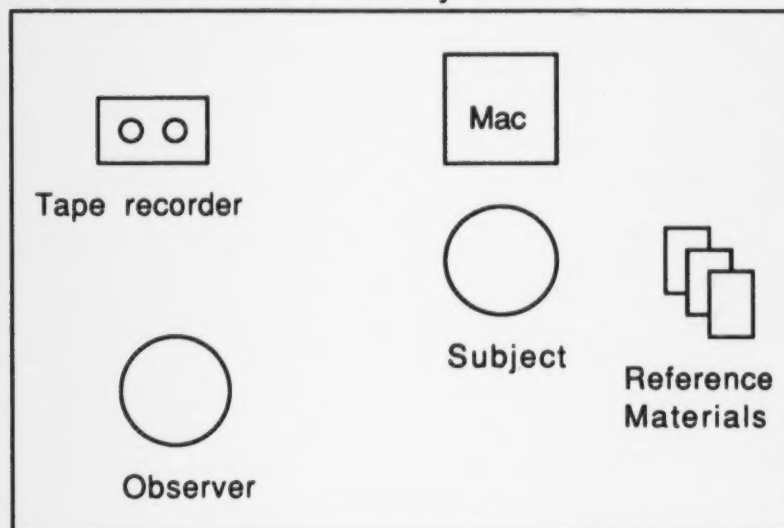
Table 1
Description of Subjects

Gender	
Male	3
Female	7
Age	
24	3
27	2
37	1
40	2
44	1
47	1
Computer Experience	
Novice	1
Casual	4
Experienced	4
Expert	1
PC Preference	
IBM or compatible	6
Macintosh	3
No preference	1
Experience: Searching	
OPAC	8
CD-ROM	7
OCLC	2
DIALOG or other search system	5
None	1
Experience: Devices, Hardware and Software	
Keyboard	10
Mouse	8
Word processing	10
Computer games	6
IBM PC/compatible	8
Macintosh	6
Mainframe	2
CD-ROM drive	6

Procedures

This study employs a qualitative, or naturalistic, design. A small sample of 10 students from two sections of Foundations of Librarianship was given a search request to complete using SilverPlatter's ERIC CD-ROM on the Macintosh. An area was set aside to assure some degree of privacy to the subject. The observer sat within view of the participant. See Figure 2 for an overhead schematic of the arrangement of the study area. Each session was scheduled to last one hour, but participants were informed that time was not an issue in the evaluation.

Figure 2
Overhead Schematic of Study Area



Using a script (Appendix B) to ensure uniformity of directions, the researcher explained the study. The subjects were informed that their session would remain confidential, and that the software was being judged, not their performance. They were advised that they

could stop the session at any time if they felt uncomfortable. The think-aloud protocol was explained, as well as the task and the equipment. Materials on hand included the SilverPlatter manuals (Getting Started manual and User Reference manual in one binder), an ERIC thesaurus, and the MacSPIRS Quick Reference Card. The CD-ROM and computer were ready for use. Participants were encouraged to ask any questions before the session actually began, but questions during the session were discouraged. At the conclusion of the session, questions were again accepted. These procedures are recommended by Gomoll, 1990, pp. 87-90.

The search question was presented on paper along with space to be used at the subject's option to jot down concepts, search terms, or ideas. The researcher was seated within view of the participant. Participant actions, use of paper sources, and non-verbal communication, as well as any other behaviors that proved significant were noted. As Patton (1980) recommends, observation notes also included "the observer's insights, interpretations, beginning analyses, and working hypotheses about what is happening in the setting" (p. 161). These notes were transcribed and integrated with the think-aloud protocol transcript, following procedures discussed by Patton, 1980, p. 149.

The think-aloud protocol was recorded and later transcribed and coded for analysis (see Appendix A). The tape recording was begun when the subject was ready to begin the search. The only researcher intervention during the search session was to remind the participant to continue to think aloud and to offer minimal

instructions when necessary. Some examples of my intervention from the transcripts are as follows:

use the mouse; move the mouse up here to this menubar, you can click on that, and then go down to select one of these topics; when you get to the end of the pad, pick that up and move it back down; drag across there, and hit backspace, will delete it; double click on MacSPIRS; come down to printing records, and that's a secondary menu, if you'll move the mouse over, and then select one of those.

At the end of the search session, the QUIS questionnaire was administered. Participants were asked to make any additional comments in writing to close the interview. These comments were added to the transcripts.

Instrumentation

Triangulation of data collection was employed to reduce observer bias. The three methods used were think-aloud protocol, systematic direct observation, and questionnaire.

The search question used was identical to that used in the Puttapithakorn study where novice users searched SilverPlatter's ERIC CD-ROM on the IBM PC:

Design and conduct a search for the following request: I am concerned about obesity in young people. What is the current thinking on teaching young children (preschool and kindergarten through third grade) about nutrition and exercise? (S. Puttapithakorn, personal communication, February 19, 1992).

Appendix B contains a script which was read to each subject before the study began. This script briefly explained the methodology of the study, explained the think-aloud protocol, and introduced the questionnaire.

Think-aloud protocol

The subjects were asked to think aloud during their search, and this was recorded on audio tape for later transcription and coding (Appendix A).

Observation

The author, within view of the subject, observed the search session, and those notes are integrated in the transcripts in italics.

Questionnaire

Finally, the Questionnaire for User Interface Satisfaction (QUIS) was administered with some modifications to the subject description section and some omissions from the user reaction section. QUIS was licensed from the Human-Computer Interaction Laboratory, University of Maryland at College Park (See Appendix C for the Site Software License Agreement.) Comments written at the end of the questionnaire were added to the transcription from each search session.

Presentation and Analysis of Data

Transcripts and author observations were integrated and coded according to the scheme in Table 2 with occurrence totals from all searchers. Data from the transcripts was broken down into three major categories: reference materials used, interface issues, and problems. Questionnaire responses were used to further clarify the data. A detailed list of events for each of the categories is listed in Appendix D with reference to the codes found in the transcripts.

Table 2
Total Coded Events by Category

<u>Reference Materials Used</u>	
Quick reference card	11
User manual and Reference guide (binder)	6
Thesaurus	15
Help screens	20
? icon (context-sensitive help)	8
Introductory screen, did subject read	5 Yes/5 No
Macintosh instructions given by author	8
Index, online	2
Exploration of software features	7
<u>Interface issues</u>	
System plusses	18
System minuses	12
Intuitive navigation	13
Navigational errors	13
Mouse problems	18
<u>Problems</u>	
Errors	48
"I don't understand what this means"	26
Logic errors	14
Response time	13

Reference Materials Used

Each of the subjects used reference materials of some kind whether hardcopy or within the software. Some quotations from the transcripts show some of the varying attitudes about use of reference materials:

I think if I was going to do this I would have read the instructions before I started. This is what I mean where I sometimes, I just go for the obvious and then after that I'm not sure, you know? Uh, that's why I don't think I utilize it the way, you know, completely. If I were paying for it I would have planned the search ahead of time. I also would have spent some time looking through the hardcopy manuals.

The noted events do not include intentions, only times the sources were actually consulted. Each type of reference material will be discussed in turn.

Quick reference card. Of the eleven uses of this reference tool, three (27%) were to check for an explanation of the ERIC abbreviations. Two subjects just looked at it to see what it was. Four subjects did not look at it at all. The one novice user accounted for the most uses. That user checked twice for an explanation of abbreviations and once for information on whether ERIC contained actual articles or just citations. Those who identified themselves as having a preference for the Macintosh consulted the quick reference card most frequently. See Table 3 for the breakdown of events by both experience and computer preference of subjects.

The reference card supplied here was actually produced for the IBM product. Even so, it provided useful information for those who consulted it for abbreviations, limiting of fields, truncation, and help with Boolean operators. This is a comfort device, as well as an informational one. This same information was available through help screens or context-sensitive help, yet the one novice user obviously felt more comfortable consulting a hardcopy source than online help (3 times vs. 1 time).

Table 3
Use of Quick Reference Card by Experience and Computer Preference

Events	General experience corr = -0.535				Computer preference corr = 0.500		
	Novice	Casual	Exp	Expert	IBM	Mac	None
0	0	2	1	1	3	1	0
1	0	0	2	0	2	0	0
2	0	2	1	0	1	1	1
3	1	0	0	0	0	1	0
TOTAL	3	4	4	0	4	5	2

User manual and Reference guide (binder). These two tools were combined into a thick binder. There were a total of six events by four subjects. Four uses (67%) were just to look at it. The other two events were to look for specific information, but no use was made of either a table of contents or an index. The subject with no computer preference had the most events (see Table 4). This binder explained software use and all interface features, many of which would have aided the subjects significantly. Some interface features might have been used had the subjects been aware of them. The size of the user and reference manuals may have deterred their use, or it may have been due to the contrived nature of the situation. One subject opened the manual, looked at the thickness of it and immediately closed it.

Table 4
Use of User Manual by Computer Preference
 correlation = 0.813

Occurrences	IBM	Mac	None
0	5	1	0
1	1	2	0
3	0	0	1
TOTAL	1	2	3

Thesaurus. Of the fifteen events of thesaurus use, only one was just to see what it was, and that by the subject with no computer preference. Four subjects (27% of total events) checked for descriptors before searching. Nine times (60% of total events) descriptors were checked by five subjects while a search was in progress. This was usually in preparation for the next search, but it also occurred during long search times when the subject appeared to be passing the time. Only one subject, the expert computer user, checked the thesaurus for age-level descriptors. Experienced searchers used the thesaurus most frequently, as shown in Table 5.

Thesaurus use caused an interesting problem. When the descriptor contained two separate words, such as "young children" or "grade one," it was listed just like that. The software, however, would then search the words separately, "young" and "children," causing long search times, and in one case, error messages indicating the search was too complex to be performed. If the subjects had used the online index, they would have seen that descriptors with multiple words were recognized in the software by a hyphen. See the discussion of index use on page 38.

Table 5
Use of Thesaurus by Experience
 correlation = 0.610

Occurrences	Novice	Casual	Experienced	Expert
0	1	1	0	0
1	0	2	2	0
2	0	0	1	0
3	0	1	1	1
TOTAL	0	5	7	3

Help screens. Two subjects never consulted the help screens. One subject, who had no experience with the Mac, consulted them for nine events out of the total twenty (45%). Once this searcher found the help screens, she used them efficiently to guide her through the processes in question before she even attempted them on her own. Though the twenty events were for a variety of questions, fifteen of those events (75%) ended with no answer being found. Either the subject chose an incorrect topic, looked for information that was not there, or needed a very specific answer that they could not find. The transcript quotations below illustrate the problems subjects had when they selected incorrect topics, failed to select a secondary menu, or just got frustrated with help:

And it's telling me what's contained in ERIC, and I'm just clicking because it's giving me lots of information that I'm not interested in. OK, so this is telling me how to, um, the terminology to use, I'm still unsure how I move from where I am now, into something narrower. I'm still real unsure how to narrow the search down. I'm going to go up to help to see if it can tell me something about printing records, no, it doesn't really say anything. I was looking through the fields to see if there's a way to expand the fields, and there doesn't appear to be, do, let's start searching and see what happens.

Two issues caused the most frequent references to help screens. Eight of the twenty events (40%) were subjects trying to find out how to return to the search screen from viewing records found. See more on this problem under the discussion of navigational errors, page 40. Seven of the twenty events (35%) concerned how to print records (see the discussion of this under errors, page 41).

? icon (context-sensitive help). Four subjects never tried this feature. One event, counted as an error and not an event here, was the use of the question mark key on the keyboard instead of clicking the icon. Three of the eight (38%) involved the searcher looking for information on how to print selected records. Only one subject actually moved the question mark to the field to reveal the correct procedure. This was the only event of the eight (13%) that yielded a successful response. Seven of the eight events (88%) were performed by those who expressed a preference for IBM or compatibles (see Table 6).

The lack of appropriate use of this feature highlighted an intuitive feature of the interface, however. When the ? icon was clicked, the normal arrow of the cursor changed to a question mark. Those users who did not understand context-sensitive help, did notice the cursor change and intuitively clicked again to return to the mouse. The one subject who did not do this immediately discovered the ability to use context-sensitive help when he received help on the help menu. He then clicked the icon to return to the mouse. Toggle functions were well understood, on the whole (see the discussion of system plusses, page 39).

Table 6
Use of ? Icon by Computer Preference
 correlation = 0.598

Occurrences	IBM	Mac	None
0	1	2	1
1	3	1	0
2	2	0	0
TOTAL	7	1	0

Introductory screen. Five of the ten subjects (50%) read this information, five did not. Those who did read it did so thoroughly and patiently. All three of the male subjects read the introductory screen while only two of the seven females did (correlation of 0.655 between the reading of the introductory screen and gender).

It would be interesting to see if arranging information on this screen in an outline format as opposed to straight text would increase the percentage of female searchers who read it. This would be an excellent place to provide a brief indication of what the database contained, the dates included, or searching tips. Copyright information could be displayed on the screen as the product is loading and then give way to a more useful introductory screen.

Macintosh instructions. The researcher interrupted eight times to give Mac instructions to a total of four subjects. Five of the events (63%) were to one subject who had no Mac experience. All eight events occurred with female subjects, two of whom had no Mac experience, and one who stated she had used it "maybe 3 times". Of the three males in the study, only one had no Mac experience, but he had extensive Windows experience which appeared to carry over

well to the Macintosh. Seven of the eight events (88%) of Mac instruction went to three of the six subjects who identified themselves as having a preference for IBM or compatibles.

With some basic Mac assistance, even those who had never used a Mac before were able to successfully navigate through this basic search task. The problem for institutions then, is how to provide this basic instruction to those with no Mac experience.

Index, online. The online index was used by only two subjects, one time each. Both events occurred while the subject was searching for a way to narrow a search, and neither found its use helpful. One subject entered the main search request, with Boolean operators, in the dialog box for the index. One subject clicked on several topics, unknowingly transferring them to the search dialog box which later caused confusion.

Several of the other eight subjects mentioned an online index, some even looked for it. If the index had been more prominently displayed, with a button perhaps, instead of buried on the right of the menubar, there might have been greater use of it. This quotation from the transcript is illustrative:

That's actually something that, something else that I could have done, is checked the online thesaurus, and I'm not sure if there is one. Online thesaurus meaning terms that are indexed. Uh, I haven't seen any mention of that, I think I'll just continue to look through the hardcopy.

Exploration of software features. Seven subjects made no attempt to explore buttons or menubar items of the software. Of the seven total events, four of them (57%) occurred while the subject tried to return to the search screen from viewing records, and none

of these were successful. Two subjects accounted for three events (43%) where they simply expressed interest in seeing other parts of the software. Subjects who explored features were those less experienced (see Table 7). The subject with no computer preference accounted for four (57%) of the events (correlation of 0.764 between the exploration of software features and computer preference).

Table 7
Exploration of Software Features by Experience
 correlation = -0.538

Occurrences	Novice	Casual	Experienced	Expert
0	0	2	4	1
1	0	1	0	0
2	1	0	0	0
4	0	1	0	0
TOTAL	2	5	0	0

Interface issues

System plusses. Of the eighteen events recorded, ten (56%) involved the interchangeability of pushing the enter (or return) key and clicking on the start search button, and the ability to type or select the Boolean operators. The inclusion of basic IBM interface elements such as using the enter or return key was a plus for those with IBM experience. Most of these subjects used both the button and the return key interchangeably without even being conscious of it. The ability to click a button to add Boolean operators to the search string was awkward because the hand had to be lifted from the keyboard during typing. It did, however, keep the operators within sight of the user to serve as a reminder. One subject took

their display on the screen as a sign that the search software did use Boolean logic. This is one of the advantages of a GUI.

System minuses. The events recorded as system minuses were varied, but four of the total twelve (33%) involved a system beep with no explanation. The three male subjects accounted for 58% of the events. Eighty-three percent of the events were recorded from those who expressed preference for IBM or compatibles. See Table 8 for detail.

One experienced searcher who received several errors regarding the complexity of his search held his ground, as shown in this transcript quotation. His search used several two-word terms (example, first grade) anded together which caused the messages; however the system gave no clue that hyphenation of those words would have caused it to search them as one term. The message could have indicated that checking the online index (and instruction on how to locate it) could help reduce the complexity of a search. That is where the hyphenation of multi-word terms was obvious, whereas the thesaurus was misleading:

Um, the question I always have in doing these searches and receiving errors is asking if I've done something wrong. Um, in this case, I don't think that I have.

Table 8
System Minus Events by Gender and Computer Preference

Events	Gender corr = -0.636		Computer preference corr = -0.511		
	Male	Female	IBM	Mac	None
0	0	3	1	1	1
1	1	3	2	2	0
2	1	1	2	0	0
4	1	0	1	0	0
TOTAL	7	5	10	2	0

Intuitive navigation. These thirteen events were noted because the subject seemed to be new to these functions, yet readily used them correctly. Functions included the toggle of the "?" icon and radio buttons, use of the close window box, and use of the scrolling arrows to move up and down. For a complete list, see Appendix D. The majority of events were noted for those without Mac or mouse experience, as shown in Table 9.

These functions are worth emphasis, because this is where the image that the designer had is transferred to the user's model of the system. Toggle keys and arrows appear to make sense to these users. It is also worth noting that one event was the use of the close window box to return to the search window. This was used by only one of two subjects who did not have a navigational error on this point. See the following discussion of navigational errors.

Table 9
Intuitive Navigation by Mouse and Mac Experience

Occurrence	Mouse experience corr = -0.674		Mac experience corr = -0.591	
	No	Yes	No	Yes
0	0	4	0	4
1	1	3	2	2
2	0	1	1	0
7	1	0	1	0
TOTAL	8	5	11	2

Navigational errors. This subset of system minuses was so pervasive that it was analyzed separately. This error occurred when a search had been completed and the records found were shown. But eight of ten subjects experienced trouble getting back to the search dialog box. Ideally, the subject had a choice of clicking within the search window, closing the records found box, or selecting Find Records (or ⌘ F) from the a menu on the menubar.

There were a total of thirteen events. Two subjects accounted for three events (23%) when, after trying numerous options, they accidentally clicked in the search window. The most frequently occurring answer was to restart the session (6 events by 3 subjects, 46% of total events), three of those after some exploration of the menubar, including seeing the Find Records option. One subject quit the session and had to restart MacSPIRS. These quotes from the transcripts show what a confusing and frustrating task this was:

I'm sure there's an easier way to do this. I'm going to start over, how can I do this? Oh, show subset, that might tell me how to get back. I've failed miserably. How do I get back to where I was, previous record? How about select fields again and see what happens. Or do

you have to print? OK, so I'm thinking here, should I get help?

This event was so pervasive, that it is interesting to see why two subjects did not experience it. There was no one distinguishing characteristic to separate these subjects from the rest of the study, although they did appear to be the most experienced. One, however, had no Mac experience at all. Both subjects were male (of three males in the study). Both had extensive searching experience with CD-ROM and online services, primarily DIALOG. One subject, identified as the expert computer user, refined his search so completely before displaying records that he did not need to go back to the search window. After his session, I asked him to return to it, and he clicked the close window box without hesitation. The subject with no Mac experience did have extensive experience with Microsoft Windows. These two users clearly had a different model of the system than the others. In any event, this basic task could be made more noticeable.

Mouse problems. One subject had fourteen (78%) of the eighteen recorded errors of mouse movement. This was the only subject who had experience with neither the Mac nor computer games. Even this subject gained confidence and improved usage during the short search task. She began the session ignoring the mouse, then when she started to use it, her entire body moved along with it. By the end of the session she was more at ease, and mouse movement was less of an effort for her. The only other subject without mouse experience experienced none of these errors (see Table 10). For three subjects with mouse experience, the primary

difficulty seemed to be accessing secondary menus under the help menu. One other subject exhibited initial hesitancy when first using the mouse which was quickly overcome. These transcript quotations illustrate the problems these subjects experienced:

Oops, OK, I need to hold the little clicker down apparently in order to have those items show. There seems to be a narrow band that one needs to move the mouse in in order to get the assistance, and that's a little tricky. I don't know how to get in there because I have held the clicker down to get over there and when I release, hm, OK, now it's all right. I am having difficulty learning to use this mouse properly. That's exactly what I need if I can get over there. Oops, I need to go up one.

Table 10
Mouse Problems by Mouse Experience
 correlation = -0.635

Occurrences	No mouse exp	Mouse exp
0	1	4
1	0	4
14	1	0
TOTAL	14	4

Problems

Errors. The majority of errors were made made by those subjects without any previous CD-ROM experience (see Table 11).

Fourteen of the forty-eight errors (29%) concerned printing selected records. Three subjects accomplished this by using the LaserWriter dialog box to print from page x to page y entering record numbers instead of page numbers. Another subject started printing from a record number in the print dialog box and then let printing continue through all records. Three subjects printed all records

without realizing it. One subject retrieved five applicable records and printed all records, eliminating the need to select specific records. (This was also the only subject who had no errors.) There was no correlation between users who had difficulty printing selected records and their level of experience or their experience with IBM or Mac computers. This function could have been more obvious. Some quotations from the transcripts illustrate some of the problems encountered:

I thought it would print the one that was on the screen at the time. OK, um, what I'd do at this point, I can't figure out how to print the one record, and I don't feel like spending any more time on this, so I'm just going to print both and manually separate the two.

Table 11
Errors by CD-ROM Experience
 correlation = -0.693

Occurrences	No CD-ROM exp	CD-ROM exp
0	0	1
2	0	1
3	1	3
4	0	2
9	1	0
17	1	0
TOTAL	29	19

"I don't understand what this means". These problems were usually identified by exactly this phrase. The subject was confronted with terminology or a procedure with which he or she was not familiar. Examples include the following: click on any word or drag across any phrase, unsure whether or not it printed, abbreviations not obvious, and records formatted so far when printing. Other

events were more general, such as the help text to narrow a search, and whether or not the search was complete. One subject noted twice that it was just not simple enough to perform a search. See Appendix D for a complete list.

Males accounted for 17 of the 26 total occurrences of "I don't understand" events (65%, for a correlation of -0.569), though 12 of those were by one person, the only subject to identify himself as a novice computer user. Generally, the more experienced the user, the fewer of these events were recorded (see Table 12).

Subjects were quick to blame themselves for many of these events, as evidenced in these quotations from the transcripts:

But no records were formatted so far, so I did something wrong there. Each line begins with some kind of code or abbreviation that, um, sometimes it's just not obvious what it means. I wonder what this records formatting this is all about. Oh gosh, I'm really not used to this Mac, how to do it, I don't know. Well, I have no idea what just happened. It was showing the percentage searched and then all of a sudden there was nothing on there. I may have done something with the mouse. Probably did. So, I guess all the blank means is that it finished the search, and I just wasn't paying attention.

Table 12
"I Don't Understand" Events by Various Experience

Occ.	General experience level corr = -0.633				CD-ROM exp corr = -0.569		Searching exp corr = 0.888	
	Nov.	Casual	Exp.	Expert	No	Yes	No	Yes
0	0	1	2	0	1	2	0	3
1	0	1	1	1	0	3	0	3
2	0	1	0	0	0	1	0	1
4	0	0	1	0	0	1	0	1
5	0	1	0	0	1	0	0	1
12	1	0	0	0	1	0	1	0
TOT	12	8	5	1	17	9	12	14

Logic errors. Although errors in search logic are outside the scope of this study, fourteen events were coded as such. One subject accounted for five of these (36%) by combining two searches, one of which had zero hits. The two subjects who had no experience with OPAC's accounted for half of the events (correlation of -0.583).

Response time. Slow response time was enough of an issue to warrant comment or explicit action for a total of thirteen events. Four of those (31%) were extra mouse clicks by two subjects due to impatience. Six events (46%) were noted as obvious frustration by three subjects. Seven events (54%) were from the three males in the study (correlation of -0.570).

As would be expected, more events were noted by those with computer game experience, but lacking experience with OPAC's, OCLC, or mainframes (see Table 13). Curiously, the correlation between DIALOG experience and these response time events was very low (correlation of 0.084).

The following transcript quotations show some frustration and criticism of both the software and the user's personality:

I'm used to having things come up automatically. I'm not used to waiting until a search is over 25% complete to have it come back and tell me that there's anything in there. This isn't a good one for an impatient person. This is CD-ROM, this is here. I'm not paying online charges or anything so it can sit there and grind, and it costs the same to sit there and grind as not. It makes me reluctant to do the logical last step of this search. If this application was a little bit faster and a little bit less awkward, I would probably be tempted to experiment around with some of the search terms. . . .It really doesn't encourage me to play around with the database at all. I'm angry because it told me that after it had searched for five minutes. So, the assumption is, I've got this client that's waiting on me to answer this question, and I've been messing around with this for half an hour, and I can't go to the client and, say, look, I don't like this. I think my search efficiency goes down after a certain time.

Table 13
Response Time Events by Various Experience

Occ	OPAC exp corr = -0.716		OCLC exp corr = -0.547		Cgame exp corr = 0.722	
	No	Yes	No	Yes	No	Yes
0	0	4	2	2	3	1
1	0	1	1	0	1	0
2	0	3	3	0	0	3
3	2	0	2	0	0	2
TOTAL	6	7	13	0	1	12

Questionnaire for User Interface Satisfaction (QUIS)

The questionnaire contained seven parts:

- Part 1: Past Experience
- Part 2: Overall User Reaction

Part 3:	Screen
Part 4:	Terminology/Messages
Part 5:	Learning
Part 6:	System Capabilities
Part 7:	User Comments

The subjects' past experiences (Part 1) were used to further describe the ratings they gave where a significant correlation (greater than 0.50 or less than -0.50) existed. Responses to Parts 2 through 6 were given on a Likert scale. Part 7, User Comments, was appended to the respective transcripts and included in that analysis.

Issues were evaluated on a Likert scale from one to nine with a "not applicable" choice also available. The lower the number circled the more negative the user's response to the interface, and the higher the number circled the more positive the response. A score of five was considered neutral. High scores indicated that the user perceived the interface positively: satisfying, consistent, clear, and fast enough. Low scores indicated that the user probably had a different model of the interface than the designers intended: terrible, confusing, inconsistent, and too slow.

Overall User Reaction. The average marks for this section were neutral. In general, those who preferred IBM PC's and compatibles gave lower marks than those with a Mac preference. The highest scores were from those with a Mac preference. Dialog users also tended to give lower marks than those who had no Dialog experience. Those with mainframe experience were more likely to describe their interaction as stimulating as opposed to those without mainframe experience, but also classified the interface as rigid.

Screen. The general response to this section was positive; the average score for each question was six or higher. The highest ratings were given by those who had used IBM PC's and compatibles. The GUI apparently was not an obstacle to their task, and their favorable ratings suggest that the characters and screen layout were consistent with their logic. The subjects who had Mac experience appeared to find the screen sequencing less confusing than those without.

Terminology/Messages. The general response to this section was positive, with the exception of a question on the helpfulness of error messages where the average response was 3.8, the lowest average score on the questionnaire. Only 20% of the subjects gave error messages a positive response with two subjects neutral, and 60% with negative responses. This is consistent with the discussion of system minuses earlier, where the major problems cited were system beeps with no explanation or messages that the subjects did not understand.

Although most subjects found the use of terminology consistent and familiar, the one subject who had no experience searching found the terminology confusing and felt that the system did not keep him informed about what it was doing. All those with IBM experience responded positively about the computer keeping them informed. Generally, the novice user gave the lowest marks, and the expert user gave the highest marks on this section.

Learning. The average responses to this section were neutral. Generally, the lower the experience level of the user (novice, casual, experienced, expert) the more difficult the system was to learn. The

most favorable responses were from the expert user. Those with OPAC experience tended to be more positive about learning to operate the system and the clarity of help messages. Users with CD-ROM experience were more positive about tasks being straightforward to perform, while those without previous CD-ROM experience were neutral or negative. Most of those who had experience with CD-ROMs (5 of 7, 71%) gave high marks for ease of learning. Of the five subjects who had experience with DIALOG, four were positive about the ease of exploration in the system, one was neutral.

It is interesting to note here that all subjects successfully completed the search task assigned, regardless of their level of experience. The time it took and the frustration level they exhibited varied greatly, but even in this contrived situation, they were able to print out relevant records from the ERIC database. The low marks for learning may have come from that frustration level rather than from a user's inability to figure something out.

System Capabilities. The interface received negative responses on average concerning system speed and consideration of experienced versus inexperienced users. There was a positive average response concerning the ability to correct mistakes. Males and those with experience using Dialog or mainframes were most likely to give low ratings for system speed. Only two of the seven females gave negative responses here. Certainly online applications with high-speed lines and large mainframes offer some advantages in terms of speed, and, as evidenced in the transcript comments

concerning response time, these users were aware of those differences.

Males also were unanimously negative about the interface taking into account the experience level of users. This is interesting because one of the men was quite inexperienced while the other two had significant experience. None of them were satisfied with the level of interaction provided. Five of the six users who preferred IBM PC's and compatibles gave negative responses here, while those with a Mac preference were split among negative, neutral, and a positive response. Of the five with Dialog experience, four were negative. One of these users had asked for a native mode before even attempting to perform the search with the interface presented, preferring a blank screen from which to enter search terms with Boolean operators by way of commands.

Summary

It would appear that the standard Mac interface as implemented in this product did not win over any users with a preference for IBM PC's or compatibles. Users at all experience levels had problems with the interaction provided, novice users expressing a need for more direction and clarity, experienced users looking for a more direct way to conduct their search. The most glaring negative concerned the error messages provided.

Implications and Applications of Results

Although the findings from the study of such a small group can not be generalized, the experiences of these searchers contributes to

our understanding of CD-ROM use and could be well used in future interface design.

Implications

A better understanding of how users interact with CD-ROM search software allows libraries to develop more effective training materials and to focus collection development efforts on well-designed products.

Users without Mac experience needed some basic instructions to allow them to complete their search. Installations without both IBM and Mac platforms available would need to make some provision for this information, whether a small reference handout or an optional online tutorial presented to the user before the application is begun. Where dual platforms are an option, one would assume that ERIC on the Mac would be chosen by those with a preference for, and thus experience with, the Mac. The Mac is advertised, though, as easier to use, and novice users may find themselves frustrated with such basic processes as moving the mouse and closing a window. Support staff or nearby librarians who may be called upon for assistance should be prepared.

Subjects used the quick reference card frequently, even when it was an inappropriate reference tool. Local development of such a card might include answers to most frequently asked questions or searching tips, such as not to search for the word "education" in ERIC or the usefulness of the online index. Leave the binder with user and reference manuals behind the desk for the staff to use during training and when answering questions. Its size was clearly a turn-off to users with a task to complete.

As for the thesaurus, while its use was heavy, the subjects would have been better served had they used the online index. The index showed the number of hits for each word or phrase, and subjects made up of two words were hyphenated, reducing search time significantly. Perhaps if the thesaurus had not been available, more subjects would have looked for, and used, the online index.

In general, Mac users gave this product high marks, and it is a step toward providing these users access to the wealth of information available on CD-ROM. Some design changes, based on the experiences of these searchers, are suggested below.

Applications

Kay describes the computer as a medium of expression, just as the book. To understand what is being communicated, the medium must be removed. As a book is being read, the reader does not focus on the act of reading, but is interacting with the material being read. Such is the task for the interface designer (Kay, 1990, pp. 192-3).

Authors agree that users should be an integral part of interface design. Gomoll (1990) includes users in all phases: brainstorming, prototyping, building, and evaluating (p. 85). Zink (1991) maintains that involvement of the user should come "early in the software design process" (p. 17). But software interface design is an ongoing process, and this study points out some opportunities for change.

The most frequently occurring problem was in returning to the find records box from viewing records. Even those who happened upon the item "Find Records" under the menubar failed to understand it or use it. This function could be made more obvious

by the use of a button, labelled perhaps "Search Again" or "Refine Search," at the bottom of the viewing records display.

Printing selected records was another problem area. A change to ease this function would be to reword the "Select Record" button to read "Select to Print." Even though this button does not cause the record to be selected, it at least provides the help text needed to inform the user of the correct procedure. Selecting records to print would be another area that would benefit from multiple forms of access, as implemented with the use of a button or the return key. Many users tried to indicate which records they wanted printed by using the "Start printing from record #" line in the print dialog box. This could be changed to a more standard Mac word processing function of "print from record x to record y." The user needs a clear indication that their selection of records has been made before getting to the printer dialog box where several subjects used record numbers instead of page numbers to try to accomplish this task.

The message "0 records formatted so far" when printing is about to begin caused consternation for several subjects. One impatient user lacking confidence cancelled printing at this stage, assuming she had done something wrong. This message could be eliminated, changed to read "formatting of records in process," or could appear with the first record being formatted as "records formatted so far: 1." For those who did not successfully select records, seeing the records formatted number count to successively higher numbers than they had intended was not a cause for concern so much as the appearance of "0 records formatted so far."

The online index was underutilized and could have made the searching task easier for several subjects at all experience levels. This important feature seemed to be hidden from users who were familiar with the menubar as well as those who were familiar with the concept of an online index. One user who actually looked for the index stopped after looking under the first three menubar items. This could be made more prominent by the use of a button with text or an icon on the search screen. The selection of hyphenated terms would decrease search time, a major cause of dissatisfaction in this study.

Because five subjects took the time to thoroughly read the introductory screen, I would suggest that this screen be used to offer searching tips and point out features of the software interface. If presented in an uncluttered, visually interesting way (such as with bullets), more users might read this and have a more pleasant searching experience. The presence of an online index could be touted here, as well as tips on accessing secondary menus under the help menu, using the context-sensitive help function, and avoiding searching the term "education." Experienced users may always bypass such information, but even a casual Mac user could benefit from pertinent searching tips. The inclination to read an introductory screen clearly existed here and could have been better used to improve the product's efficiency.

All ten subjects successfully completed a search and printed results from a CD-ROM which they had never searched before. That in itself is praise for any product. As students in a masters' program in library and information science, these subjects may or may not be

typical users of MacSPIRS, but their experiences in this study presents valid design issues when a product is being developed or upgraded.

Conclusions and Directions for Future Research

By creating a descriptive taxonomy from a single community's use of a single product, this study hopes to be, as Shneiderman (1987) suggests, "a small and useful contribution to the emerging mosaic of human performance with interactive systems" (p. 79).

The CD-ROM interface studied here employs all three of Piaget's stages as Kay (1990) urges designers to do. They were successful to varying degrees, however.

The enactive stage, particularly the use of the mouse, presented a significant problem to only one of the ten subjects. Even this one subject progressed considerably in ease of handling the mouse through the one short search session conducted here. This differed from the findings of Ziegler and Fahnrich (Shaw, 1991) who found consistent problems with mouse manipulation for the novice user.

The use of the iconic stage could be enhanced, examples being the lack of online index use even when subjects tried to find it and problems selecting records to print. A well-designed icon for the index, or as Herther (1986) suggests, integrating it into the search process, and a button with better wording for selecting records are possibilities. The GUI as implemented here was successful in that it removed the burden of remembering commands from the user; however, users experienced problems remembering the location of

commands hidden under the menubar (such as print), and seldom used the Boolean operators listed as the buttons they were, but rather as reminders that they were available.

The greatest problem within the symbolic stage was the confusion over how to return to the search window from displaying records, referred to as the navigational error. Eight of the ten subjects experienced this error. Clearly, the process did not correspond with the users' mental models of the system. Again, the addition of an icon or button would eliminate or reduce these errors. The consistent Mac interface appeared to aid Mac users, as Shaw (1991) has found, but caused some confusion for those unfamiliar with Mac standards.

The implementation of Menu-Based Natural Language was not always helpful to the subjects here. As mentioned above, Boolean operators were within view of the user, which was a good reminder that they were available, but the efficient use of buttons here is questionable since it involves removing the hands from the keyboard to use the mouse to click for the insertion of a two or three letter word. It seems easier to just type the Boolean operators. Another example of confusing implementation is the Select Record button. A more explanatory label might be Select To Print.

No choice of interface was offered for those with differing levels of experience, as suggested by Shneiderman (1987). This proved to be a problem for both the expert and the novice in this study.

Shneiderman's (1987) eight underlying principles of good interface design are well-illustrated in this study:

1. Strive for consistency. The implementation of the standard Mac interface was a plus for Mac users. The consistent layout of the screens was received positively by most users.
2. Enable frequent users to use shortcuts. There was no provision for this, though none of the subjects here were frequent users.
3. Offer informative feedback without confusing error messages. Error messages were often just beeps with no explanation.
4. Design dialogs to yield closure. The navigational error represents the greatest hindrance to the user's sense of accomplishment.
5. Offer simple error handling. Error handling often used Mac terminology with which IBM users were not familiar, such as "window" and "drag". An error message encouraging use of the online index would be appropriate instead of simply informing the user that the search was too complex.
6. Permit easy reversal of action. The users could cancel searches and prints at will. One subject consistently cancelled searches because there were zero hits with the search less than 100% complete, which had no relation to the outcome of the search.
7. Support internal locus of control. This is questionable considering the navigational error and the discomfort (even frustration) caused by the long response times.
8. Reduce short-term memory load. This would be further enhanced with the addition of print, index, and return to search buttons or icons.

The methodology used in this study, though commonly employed for such research, still presents some problems. Some subjects were visibly nervous, had problems thinking aloud, or admitted that they would have done things differently had the environment not been so contrived. Some examples from the transcripts illustrate this clearly:

It's just thinking that, um, you know talking out loud is, uh, kind of confusing me. I was thinking if I had some peace and quiet I could figure out what's going on more. I think I go too, I tried to do it the way I thought would be, the way I should do it, but I usually just go in and put any two terms in there, see what I come up with. I think if I was going to do this I would have read the instructions before I started. If I were paying for it I would have planned the search ahead of time. I also would have spent some time looking through the hardcopy manuals.

This may indicate a link between a subject's degree of introversion or extroversion and the implementation of the think-aloud protocol. This could be an area for future research.

Perhaps only covert observation would reveal if subjects would really have consulted hardcopy reference materials or more carefully planned their strategy before searching. I have no doubt that some of the subjects in this study would have quit in frustration had I not been observing them. It is impossible to guess, however, if they would have sought help from reference material or a person before abandoning their efforts.

Other suggestions for further research are following:

- study a similar or dissimilar community to compare results,
- use a counterbalanced design with subjects performing a search on both IBM and Mac platforms,
- narrow the subjects to only those with a Mac or IBM preference or to those with equal searching skills,
- gain access to the code, change one thing and measure the effect, such as integrating the online index into the search process,
- return to Shneiderman's (1987) list and design studies to measure the time needed to learn the system, the speed of performance, or the retention over time.

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APPENDIX A CODED TAPE TRANSCRIPTS

Key:

Normal type is tape transcription.

[Interviewer's comments in brackets.]

Interviewer's observations in italics.

BUTTONS ON SCREEN IN ALL CAPS.

"What subject typed in quotation marks."

Codes, in alphabetical order:

E	error
Ex	searcher explores system functions
H	use of help screen
I	reading of introductory screen
Idx	use of online index
L	logic error
M	problem with mouse
Mac	Mac instruction offered by interviewer
NE	navigational error
N+	intuitive navigation
Q	use of ? icon, for context-sensitive help
QR	use of quick reference card
RT	response time issue
S+	system interface pluss
S-	system interface minus
TH	use of ERIC thesaurus
UM	use of user manual
?	searcher doesn't understand

Session 1

This is a novice searcher with no Mac experience. She has experience on an IBM PC at home, though. She asks what Boolean is and seems familiar with the concept.

I *She takes time to read the introductory screen before beginning anything. She makes no notes on her search. She has no previous searching experience.*

OK. All right. All right, I'm starting the, um, search now. And I'm going to um start by typing in, um, "elementary education".

S+ And I'm going to hit ENTER. *RETURN, actually on the Mac.* And on the screen, now I have, um, appearing records in elementary and records in education and records in elementary

education. *She is obviously going to get a lot of hits on this. It doesn't occur to her to BREAK SEARCH.*

E The system is still, um, searching, I'm going to ask for, ask for the records so far in, um, well I'm going to try #3, records in elementary education, although it says there are no records there. Nothing happened.

E So I'll try, I'll try pressing #1, elementary. Nothing happened there either. Maybe I need to wait until the search is completed.

E I may press the, um, question mark. *She hits the question mark on the keyboard, she does not click the icon ?.* Although I'm not sure that's going to be helpful. Nope, nothing happened there either. Hm. Moving the mouse over to the help area and we'll see what that does. *This is the first time she has noticed the mouse.*

? Something has appeared on the screen called BREAK SEARCH, but I'm not sure what that means because it's still searching. Maybe I should check one of these resources here. Ok, let's see. OK. [I'm going to remind you to think aloud. Tell me what you are thinking.] OK.

QR I'm looking at the, um, SilverPlatter Quick Reference Guide, to see if it can give me any helps here on how to move from what's happening now on the screen which is basically the system is still searching, 66% complete at this point, um, but I really need to move into something more specific, so I'm looking at this guide to see if that's going to give me any help. I see a searching free text, um, information. That tells me to press F2 to display the find prompt. I'm not sure if I can do that from where I am at this point. Well, let's see, I'll try it. Hm. I'm used to a keyboard that has, prompts, you know, the F2 keys, F4, I don't...

Mac [Let me interrupt you here. If you'll use the mouse, and move this down to BREAK SEARCH, and then click it.] OK. Then that will stop? Ah, OK. I moved the mouse down to BREAK SEARCH and now we have something that says SHOW RECORDS FOUND. So I think we'll try that, and we'll see what... Ah, OK, now this is going to show me everything it found, which is several thousand files at this point, and I don't think I want to look at everything, so I need to get something a little more specific. At the bottom of the screen we're seeing NEXT RECORD, PREVIOUS RECORD, SELECT FIELDS, SHOW SUBSET, SEARCH FROM RECORD or SELECT RECORD. *She is careful to read the screens. Um, let me see.*

- QR The um, the guide for the uh SilverPlatter Quick Reference Guide, I'm not sure that this was designed for use with the Macintosh computer. Perhaps it was, but I'm not sure that it, um, would appear that it was not. OK, let's see.
- E I want something more specific, so let me try SELECT FIELDS and see what that does for me. Uh, nothing changed on the screen, I still have this first file on, uh, a progress report on a funded program on the educational, instructional program for the TV, District of Columbia public schools, which has nothing to do at all with the topic that I'm, uh, interested in.
- M *She has trouble putting the mouse inside the button. She has not made any effort to use the menubar -- does she not know about it? She puts the mouse pointer at the top edge of the button, and it obviously doesn't work, but she fails to interpret a lack of response as an incorrect mouse click. I'm going to try, um, something called SEARCH FROM RECORDS.*
- ? The screen says click on any word or drag across any phrase that you want to use in a search. Hm. Click on any word or drag across any phrase that you want to use in a search. I'm not sure what that, um, what that means.
- E I'm not sure if I can type something in, the word or phrase that I want. I'll try it and see what happens. No, nothing is happening. Hm.
- M Well, there's a box that says OK at the bottom of this little box. I'll click on that and see what happens. I just, it just came back to the same, um, the same item that was on the screen before. Let's see what happens, SEARCH FROM RECORDS. Nope, that was exactly what I had before, um, OK, let's get to SHOW SUBSET. We'll see what that does. Ah, well, I'll cancel that because what is shown on the screen is show subset, selected records, all retrieved records, or skip to record number, and since I don't know any record numbers I want to skip to, and I don't want to show all retrieved records, I don't know, maybe selected records, maybe that would be a thing to try, let's see.
- NE I'm sure there's an easier way to do this. Well, I pushed on selected records, but nothing happened. *Selected records is not showing as an option since she has not selected any records.*
- S- *The systems beeps, but no error message appears. Since it's blinking on skip to record number I assume that's what they want and since I don't know a record number I'd better get out of this.*
- Q I'll just cancel this, although there is a question, maybe I could, uh, let's see if, let's see if that gives me any information there if

I click on question. No, same, except now I have a question mark with my mouse. *This is where field sensitive help would come up, but there is little indication that that is what this is supposed to do.*

N+ OK, now I'm back to the arrow. I just pressed the clicker on the mouse again and got rid of the question mark. I'm going to cancel this. OK, now I'm back to where I was before.

M *Very hesitant with mouse movement.* Uh, I'm going to check one of these other reference things I have now.

UM I have a, uh, a binder entitled, ah, the MacSPIRS User Manual. Now that would have been something to start with. Looking at the getting started, MacSPIRS is already running, let's see what,

Mac [As a Macintosh novice, let me point you to one other source. If you move the mouse up here to this menubar, you can click on that, and then go down to select one of these topics, OK? Help. OK? And those arrows mean there is more over here.] All right. [Then if you lift up on the mouse, you'll be where you stopped. See that? OK?] All right, thank you very much. OK, I think I will go to the, um, help area at the top of the screen.

M Oops, OK, I need to hold the little clicker down apparently in order to have those items show.

H We have Getting Help, Guide to ERIC, Finding records, Showing records, Printing records, Saving records, etc. Uh, and I'm going to go down to the Guide to ERIC. OK. Hm.

M Apparently you need to keep the clicker down, all right, all right, now I'm going to move over to the Introduction in the Guide to ERIC.

M *Trouble selecting from a secondary menu.* Well, I was. All right, now I'm moving the mouse again into the Guide to ERIC and there seems to be a narrow band that one needs to move the mouse in in order to get the assistance. And that's a little tricky.

E And for some reason, hm, well now I'm back to my search history and the original search request. *By mistake, she gets back to the search screen she's been trying to locate, but she continues to try to get into help.* I'm still up here trying to get back to the help. OK, all right, now I'm moving the mouse down to the Guide to ERIC.

M All right, and I'm going to try to move the mouse across in this narrow band, but I'm going, it's going to take some doing, and perhaps you don't really need to do this, but I don't know.

M All right, I'm in the Introduction now in the Guide to ERIC, but I don't know how to get in there because I have held the

clicker down to get over there and when I release, hm, ok, now it's all right. We have the ERIC introduction on the screen now. And it's telling me what it is. And I assume, let's see, to see more of the screen, and I'm not sure if I press, no, there are no arrow keys, um, OK, do I have to get over, do I have to get the mouse over here to the, uh, there.

M *Painfully slow with the mouse.* Now let's see if the, ok, all right.

N+ I moved the mouse over to the far right of the screen to the arrow that goes up and the arrow that goes down, and that's how I'm moving the, uh, moving the page. *She easily figures out the scrolling window.* All right. And it's just telling me what ERIC is. And it's telling me what's contained in ERIC. And I'm just clicking because it's giving me lots of information that I'm not interested in. Here we get to the database structure, hm. The last thing appearing here is that each item or document in ERIC is called a record, all records are divided into fields, see guide of fields for a list of fields in ERIC. Apparently this is all there is in the introduction. OK. So now to get out of this, I think I'm going to look at the guide again.

Mac [I'll help you out here.] Oh, OK. [If you click this little box in the left hand corner of the window, it will close the window.]

M All right, but I have to get the arrow up there, right?

Mac [When you get to the end of the pad? Pick that up and move it back down.] Oh. Oh, OK, all right.

M All right, I'm leaving the ERIC introduction. At least I think I am. [The arrow has to be really inside the box.] *Hand-eye coordination isn't good. Wonder if she's used a computer or video game at all?* All right, so now I'm back again to the initial search history, so if I want to go over and get a little more help.

H I'm going back over to the help area and this time I'll need to choose a different, oh, I think Finding records this time is what I'm going to go to. And I'm moving the mouse down, and I'm in finding records, and I'm going to go over to starting, I'm moving the mouse to the right, and I'm going to start a search. OK.

L *Interesting that for help she picks starting a search as opposed to narrowing a search which is really where she is in the process. Did she not read the entire list before choosing?* All right, now we have information on starting a search, telling that the find records box appears at the foot of the screen when you first start up MacSPIRS, and for the simplest of

searches, type a word, click the START SEARCH button and you'll see the results in the find records box. OK, let's, my initial word was far too broad.

- M I am having difficulty learning to use this mouse properly, OK. *Her entire body leans as she moves the mouse.* All right, now I'm still continuing with the explanation on the screen of starting a search. It's telling me that if my search request contained more than one word, the system would repeat intermediate results for each word, treating each word as an individual search request before searching for the combination, so that's why I got records for elementary and education before records appearing in elementary education. OK. Um, and now it tells me that we could search with a term or a phrase, a hyphenated phrase, etc. What I'm looking for specifically is how to get, um, once you've done a search in a particular, um, in a particular term or phrase, how to then narrow that down, and this information on starting a search is not going to tell me that, so I'm going to get out of this now by again moving the mouse up to this little box. We'll see if, OK, I'm going to have to go back up to the help. All right, I'm clicking on help again. Apparently my guide and finding records is not specific enough, so perhaps Showing records is, well, let me look at Finding records again. Ah, there we go, Narrowing a search.
- M That's exactly what I need if I can, get over there. Oh dear. OK. Now, hopefully I'm on narrowing a search. Nothing is showing on the screen, ah, here we go, narrowing a search.
- RT *She gets very nervous here when the system response is slower than expected.* All right. Right here, there are several ways to narrow a search, browse through the index, combine words or phrases, using and not or with or you can search in a particular field, operators are discussed below.
- N+ OK, let me, all right, moving the screen down, now, most databases have specially indexed limit fields, example, language, publication year, that you can use with other search terms. Use the and operator to retrieve all records containing two or more specified terms anywhere in the record, for example drug and abuse would retrieve all records containing these two words. Um, all right, I see, use the with operator to retrieve words, records in which two or more terms appear in the same field. All right, so my search is on nutrition and exercise. Um, so then I could search in both nutrition and exercise and nutrition with exercise. OK. And by using a near

term I could search for, um, how close the term should be, for example. All right, and the not, using the not operator would retrieve, um, one or the other. Finding a term or terms in a particular field. All right, now it's telling me how to find a specific entry by author, if I knew any authors, now. Searching limit fields. All right. I'm on the section entitled searching limit fields, and this is telling me I can limit my search, perhaps the equal sign or in. Oh, all right, if I wanted to search for records in a particular year, or earlier or later than a particular year, or equal to, or specifically in a particular year, I don't need that, so I'm going to move on. Uh, I could limit it further by using the, uh, operators and, or, with, along with the, um, uh, greater than, less than, equal sign with the year, so that would be another way of of narrowing it more specifically.

? OK, so this is telling me how to, um, the terminology to use, I'm still unsure how I move from where I am now, into something narrower. Let's see if there are any other, any other, um, guidelines here that are going to help me. *She is so diligent about reading through help for narrowing search, but still unsure how to do it. She needs more specific information about what to do next.* OK, I'm going back up to the help again, although we have down at the bottom of the screen now, enter search and combine terms using and or not with or near, so maybe I'll just go down there and try.

E All right, I'm going to try pressing the term AND and see if I get something. Hm, no, I didn't get anything. *I think she clicked on the word "automatically" when she was displaying records originally, and now it is in the search box. When she presses AND, she now has "automatically and" in the box, but she hasn't noticed yet.*

H All right, I'm going back up to the help. Sigh. I don't think there is anything in the finding records that is really going to help me, or maybe I'll try showing records this time. All right, let's see, showing records, my options here are using show records, selecting fields, selecting records, displaying field labels, I don't think that's going to help. I think there's something, OK, let's, I think maybe what I want to do is clear this record, so maybe let me try that. OK. This is going to give me information now on clearing a search, it erases search request from the search history window. To erase unwanted searches, select clear searches from the search menu, type the number of the last search request you want to erase and press the OK button. Um, hm, I don't know if this is really going to be

what I want or not. I can see, um, from this experience that attending the, um, uh, ERIC introduction course at the education library at OSU would probably be a fine thing for me to do, um, and also, I think that without that it might be possible for someone to get a little frustrated. [Are you frustrated?] Not really, I'm just, um, you know, what I really want to do is somehow just perhaps going to the indexes themselves, the paper indexes, I would have saved time, at least at this point, but, OK, I'm going to clear this. Now let's see, if I want to see the, I'm still real unsure how to narrow the search down, because I don't want to look at all 74,000 records that they found in elementary education.

EX If I go to search here, on along the top of the screen, let me see what happens. Find records, browse index, list field names. *Much more comfortable at this point exploring menu options.* All right, good. I think that may be what I want to do. OK. Well, I'm not sure that is. I don't think that's what I want. What I have here is a list of field names, and I don't think that's... OK, let's see. We're back here to search, now OK, find records, is this going to, probably that's what I'm doing now.

Idx Browse index, oh, here.

E *When index comes up blank, she easily sees the entry line for word or root, but types in her search terms as opposed to an index entry.* OK, enter the word or root that I want, OK, let's see. I'm typing in "nutrition and exercise". I'm going to press enter, ah, and it's telling me that only single words and hyphenated phrases can be looked up in the index, and I thought that you could use both, but perhaps not. Um, hm. OK. Well, let's see.

E Well, I was trying to get rid of the 'and exercise,' and again, I guess because of my inexperience with this Macintosh I've succeeded in erasing nutrition and the 'a' in and instead of what I wanted to do. The clear button is not helping me, at all. *She uses the Clear key first, then backspace to delete. The clear key inserts a square.* And there is no delete button on this Macintosh, so I'm not sure how you get rid of mistakes. *There is a delete button on my SE keyboard at home.* Do you want to tell me?

Mac [Uh, yeah. You can either drag, ok, drag across there, and hit backspace, will delete it or if you have something in there and you're here, and you can move these arrow keys down at the bottom, then use your backspace key, either one.] OK, thank

- you. All right, I'm going to type in, the word just "nutrition", and we'll see what happens.
- S+ Press the return button, OK. Now I have lots of things showing up, um, in a box under the index, um, nutrition alone, um, nutrition and gerontology, nutrition and school, nutrition and education. Uh, let me see what, what we find what nutrition-education.
- E Let me see what I'm clicking on nutrition-education-and, I don't know if there's something that comes after that or not. Hm. The bottom of the screen, we see the last part of the word automatically and nutrition. [Let me get you out of this because I know what you did, but you didn't notice it.] OK. [I'll just get rid of that for you.] OK, now I see at the bottom, nutrition education and training program, that's not really what I want, um. I'll just try nutrition and education.
- E *Even though what is selected from the index isn't what she wants, she doesn't hit ERASE before selecting another.* Hm. Apparently I needed to erase what was there before, before I tried a different term. Hm. OK. OK, I'm back to nutrition education and training program, I don't think that's what I want. I'm tempted to go down here to the bottom and press ERASE and see what happens. Ah, OK. That, um, erased the particular term that I was clicking on, and I'm going to try now just simply nutrition and education. All right, since there are only three records in nutrition and education, I'm going to show the records now and see what there is, and see if it, uh, hm.
- E *After figuring out the ERASE button, she doesn't START SEARCH. She still hasn't figured out the button concept, I think.* But all I got was the initial record that I wanted in elementary education, I did not get the, uh, particular record in nutrition and education.
- E I'm going to try here clicking on SHOW SUBSET and see if that will give it to me. But I don't think so, no. Goodness. Sigh.
- H I'm back up now to help again, because... No, that's not what I want. Search. *Show Searches from menubar finally gives the screen she wants.* And I want to find records. No, I guess I don't, oh, in nutrition and education, yes, which showed up at the bottom. Oh, I know, I need to start the search in that area, OK. At the bottom of the screen, I'm going to press on the box marked START SEARCH. All right.
- E So it found three in nutrition and education, and now I'm going to click on nutrition and education and see what happens. And

- nothing happened. *Actually, it moves the terms into the search box, but she doesn't notice.* And if I go down to, SHOW THE RECORDS FOUND... All right, right, now I have, OK, I have a record now in nutrition and education, the first record, which is an article on the effectiveness of radio nutrition education.
- N+ I don't think that's going to help me very much, so I'll go to the next record. *More comfortable with mouse at this point, easier to select buttons.* All right. Ah, this one, an inventory for assessing food behavior of elementary school children. It's possible that that would, um. Yeah, it's possible that that article might. Now, let's see, I might, I'm going to go on and look at the third um, the third article that the system has found. Ah, this one on the development of a nutrition inservice course for teachers of young children, now that could be helpful, as well. All right, so I think that two and three would be um, might be helpful sources, so let's see I want to, since I'm supposed to print five of them [if you find five], yeah. I will print those two at least. Now I need to figure out how to do that. Um. OK.
- H I'm in the help area, and I'm moving the mouse down to printing records. OK. I'm going to click on selecting records, for printing, I'm hoping that, OK. I can print it by clicking on any record number, and when you click on the record number it's displayed in bold. All right, when you've made a record selection, OK. The print records dialog box offers the option of printing all retrieved records or just selected, the dialog box will offer the option of specifying a record number from which you want the printing to start, ok, that's what I want to do. All right, so I need to first get out of this help box.
- N+ Now, I'm going to move my screen, I am now on the, um, third, um, record, that was found and I'm going to move to the previous record, ok, now I'm moving the mouse up to the record number 2 of 3 and I'm going to click, ok, and that's appearing in bold now, oh dear, and I don't think I've found now how to print.
- N+ If I click this again, I believe that says I don't want to print it. Let's see. Yep.
- H Better go up and read the help again. Oh, OK. Ah, OK, then I need to go to the show subset dialog box, after I click on the record I want to print and that's what is going to, all right.
- E *Still a bit difficult to select secondary menus in help. She got to that help screen by mistake, the mouse slipped when trying to select Printing in the help secondary menu.* All right, I'm back

on the screen again, it's my second reference, I am now clicking on that reference, and it's appearing in bold, and I'm going down to the show subset box, and I want to print selected records. So that's what I'm going to click on. Ah, hm.

- N+ *She discovers radio button by clicking and deselecting it. Figures out the toggle idea easily and re-clicks to select.* All right. I'll go with OK, and I'll see what happens. I don't know if that's printing now or not? [No, it's not.] No, OK. All right, well, I did something wrong then. Sigh. All right, I'm going back to the show subset box. Hm. [I'd encourage you at this point, to go back to your help and try that one more time.] All right. *She is coughing and seems bothered.* [Would you like to take a break and get some water?] Oh, no, I'm fine.
- H OK, I'm back in the help. And I'm going back to the printing. And I'm going to try this, let's see, using print records, let's see if that will tell me what I need to do. All right. It's telling me first that I need to be connected to a printer, and I assume that I am. If I want to print records found by a previous search, I must make sure that I make that search the most recent by repeating it, the easiest way is to click on the number of the search you want to repeat, OK. Then select print records. Hm. All right, well, if I saw print records on here somewhere that would be helpful, but I don't. OK, apparently, this isn't going to answer my question. [Try scrolling back up to the beginning of that.] OK. Moving back to the beginning of the, uh, this explanation. Ah, OK. I can print the record by selecting the print records from the file menu, all right, I see then that's where I need to go is to the file menu. So that's what I'm doing, I'm going now to the file menu. And, I want to print the records. All right. Ah, OK, I want to start printing from record number 2, I also want to print record #3, I don't know, let's see. I want to print selected records. Hm, well that doesn't do anything, OK, well the screen says start printing from record #2, and that's what I want to do, so I'll print that one.
- M *She has a problem getting the arrow in the radio box.* And, I want one copy. And I'm going to say OK.
- ? Hm, OK. I, did it print that? *The printer is not close in proximity here, but the message should have made it clear that it was printing.* I think it printed that particular reference. Now, I guess I'll go to the next record and print...
- S- [Beep.] Hm. For some reason it's not going to the next record. [Beep.] And I don't know why. Let's see if it will go to the

- previous record. [Beep.] *The system beeps, but there is absolutely no indication of what the problem might be.* No.
- ? Sort of stuck here in reference 2. Hm. I'm not sure why I can't get out of this.
- H I'll go back up to my help box again and see. Something called restarting the session. Maybe there's something I need to do in that. Use the restart session in the file menu at the beginning or end of a work session. Um, I don't know. I'll go back up to the file menu, and see what's in there. Maybe I was supposed to do something after I printed that last, that last reference. We have save records, options for save, printing records, I do want to print, I want to print #3, but I don't know if I can get to it from this point or not, because I have not clicked on record #3 yet. OK, I'm in the print records box, and I don't want to start printing from record 2 which is what it says, um, I guess I'll cancel this. I still want to try to get to record #3, I'm going down to the bottom of the screen where it says next record, and I'm clicking again [Beep.] and nothing's happening, it's just beeping. Let's see what happens if I go to select records.
- E Select records by clicking on the record #, oh, I know what the problem is, I did not, I need to go back to record #2 and click again because in the bold, and get back to the regular type instead of the bold. OK, good, now I think I can go to next record. [Beep.] No, hm. Can I go back to the previous record? [Beep.] No, let's see I didn't read enough in select records. I'm reading the text on the select records box. Sigh. It's not necessary to click the select records button before selecting a record, OK, but click again to deselect a record, which I did, I thought.
- H I'm going to go back up to the help box and see if it, see if it tells me anything under showing records. Um, I'm going to see something about selecting records here under the help. OK, when I've made a record selection, the show subset dialog box offers the option of displaying just the selected records or all retrieved. Oh, show subset, well let's see if I can, I don't think I can get to it from there, but I'll see. I'm getting out of show records and I'm going to go down to show subset, and I don't think that's going to help me at all. OK, now I can skip to record #3, let's see if I can really do that. I typed #3, entered, ah, and here we go, wonderful, wonderful. Now I want to print this thing. #3. So I'm going to click on 3 of 3, that puts it in bold. Now I'm going up to file. And I want to print this. I'm

clicking on print records, and I want to start printing from record #3, so I'm pressing print. I want one copy. And I'm clicking OK to print. OK. Sigh. So we've printed two records now. [Would you like to stop now?] It's up to you. [You've done a fine job.] Well, I'm not sure about that. Yeah, why don't we stop at this point. *She relied heavily on help, but the topics weren't as specific as she needed. It was frustrating that there were no messages to assist her when she needed it.*

QUESTIONNAIRE COMMENTS: Lack of familiarity with a Macintosh computer and the mouse compounded my problems with the program. I think it would have been more helpful to me had I read the instruction manual before beginning the search. I assumed the system was similar to an automated card catalog where after beginning a broad search you can easily narrow it. I found narrowing this search to be incredibly complex, but again reading the manual first might have given me more specific direction.

Session 2

Some Mac experience, no searching experience. She is checking over the reference guide and making some notes for search strategy.

I *She is reading the introductory screen and looking through the manuals.*

Well I'm just going to kind of experiment with it without looking at anything first. And then see what happens when I do it. First I'm just going to type in "obesity and children".

St+ *Note that "and" is typed, not selected from the Boolean buttons. 68 records found on that. So we'll see SHOW RECORDS FOUND. Let's go to the next one and see if it has any summaries or anything like that. See, here would be one, teachers' perceptions of childhood obesity. That would have to deal with teaching young children. Oh, here, I didn't even see this down here about the childhood needs. Education and the elementary school student. The journal is health education. Go to the next one. Another one you would probably want to look at. Down here. It deals with elementary and secondary education. So that would just be another one. I'm not going to go through all of these because there are 68 of them. Just maybe 10 of them. This one, too. Is there a crisis in youth fitness, that would have to deal with it. Next one. Next one.*

RT *She is impatient when waiting to go to next record.*

E *Extra click causing skipped record. Right here, childhood obesity, concern for the physical educator. That would have to*

deal with it. *Very proficient with mouse.* Well, I was going to do about ten, but I see I'm on about 25, so I'm going to go, I don't know, see what this is.

E *Continues to click when clock icon shows working -- many records skipped.*

EX SEARCH FROM RECORDS. SELECT FIELDS. See what that is.

E I did something wrong. [System bombs.] *System bombs because of repeated mouse clicks before the system was ready to accept them. I don't know if she figured this out. She is confident, but nervous.* I put the CD back in, then I'll just restart it.

Mac [If you'll double click on MacSPIRS.] *She can restart without problems, again confident.* OK. This time when I do my search I'm just going to use two different words. Um, probably nutrition, or maybe just obesity again, and education, this time. [I want to encourage you to think aloud. Let me know what you're looking for or why you might be...]

QR *Refers to reference guide for help with Boolean operators.* OK. I was looking to see if you could use three words instead of just two, and then I'm looking to see now the differences in the terms and or, because the first time I did obesity and children, um, now I'm looking to see what maybe or or with is. OK. I'm just going to type in something different now. Nutrition with exercise, no, nutrition with obesity, or "obesity with education".

TH *Checks thesaurus briefly, just to see what it looks like.*

UM *Peruses getting started manual while "obesity with education" search continues.* Now I'm going to get adults in there too, but at least I can see how many I'm going to get. What I'm trying to do, I guess I should probably look and see how, once I get this, how to get children in there also. Found 55 of them. Hm. Now I'll see if there's any way I could take obesity with education and add children in there and search that also.

UM *Flips through Getting Started to Reference manual. There is no use of index or table of contents.* Here we go. Probably just type in #3 with children. So there are 9 records. So that would probably be a good indication for finding out what you want to know. I'll show the records found, see if it is dealing with what you want to know. This one would relate to it. *No use of scroll field to see if abstracts are available.* Go to the next one. Title childhood obesity a concern for the physical educator. I might have had that one before, also. I don't remember. Title childhood obesity. Right here, the title of this one, relationship between nutrition and learning, a school employee's guide to

information and action. Childhood obesity, implications for physical education. I want to go back where I can search.
[Prompt you to think aloud.]

NE *At point where she wants to go back to search screen, she looks 'under' buttons to see what is there. No use of menubar yet.*

EX OK. I'm just reading this now. Just trying to see what some of these things are now. I don't know if I looked at SEARCH FROM RECORDS. I want to get back, but I don't know how to do it, unless I just keep hitting PREVIOUS RECORD, 9 times. There has to be an easier way to do that. See if it goes back to previous record. No. Looking at the menu up above to see what everything is. *She browses menubar items -- bypasses quickly Search and Show to Help, but finds Narrowing a Search unhelpful.*

H Looking under help. Going under finding records to narrowing the search.

M Oop. I need to go up one. *She has trouble with secondary menu, but fixes it easily.* See what it says. That's not helping me do what I wanted to do which is to go back to the beginning. It's just telling me kind of what I knew already. OK. I do want to get back. I still have to figure that out.

UM Looking in the book now to see if there's anything, but I'm kind of glancing through it, I'm not going to read it. It says restart session, but I'm not sure I want to do that, because it might restart the whole thing, and not restart me to where I have nutrition, or obesity with education. Might.

Idx Hm. I'm going to see what browse index is, and here I have it back, but that's not what I want either. [I'm going to encourage you to think aloud. Tell me what you're doing, why you're doing it.] *Browse index, first confuses word or root entry with search screen.* OK. Um, I'm going to enter the word nutrition in there to see what it does. I never put that in there. I don't really think, I think it's going to confuse me more than anything else. Oop, went too far.

N+ *In index, uses right scroll arrow to view terms in entirety.* Nutrition at school, nutrition education, things like that might help. Well, I'm out. I don't see how it's going to get me back to where I want to go when I get out of there, out of the index.

H I'm going to look under help again. Going to Guide to ERIC. To examples, see what that does.

QR Up here in the examples, it is giving examples, and I don't know what some of the abbreviations are, which they are here in the reference, which I forgot about this, actually. I'm

leaving that little help thing. *Sweeping movements of mouse occasionally.*

H Then, under help, restarting a session. See, it says, clears the search history, so I don't want to do that. And that's done, so I know that's not what I want to do.

EX Search, see what options for find is, display intermediate results. Gonna cancel that. List field names, see what that is. Oh, I saw that already. Cancel that. Find records. See what that is. Here we go. Something else. Showing what I searched. And I can search and add to it, which is what I was looking for. So I want to see what else I want to add. Right now I have obesity with education with children. Um, if I just maybe want to try to add to that, do a #5 and nutrition. 5 records.

S+ Types #5 -- *no use of clicking in history window.* SHOW RECORDS FOUND. Uh, saw this one already, can we help these children. Saw that. Go to next record. Saw that one. I think these are probably all ones I've seen, I guess. Yep, saw that one. And the last one, saw that. [Keep thinking aloud. What are you thinking.] OK. [What do you want to do next?] *Reminder to print records, she seemed at a loss of what to do next. I wonder how well she read the instructions. I don't know, to be honest.*

EX I guess I'm really kind of playing with it to see what everything does, since I've never used it before. [When you get answers that you think answer the question, print off 5 or up to 5, don't print any more than 5.] Oh, OK. [Print out up to 5 of them, what you feel like are good answers.] Well, I think I'm going to print these 5, because it's, I feel at least it's dealing with things you want to know about. The obesity, the nutrition, the young children, and the education. So I'm going to go to file, and select print records. Select fields, selected records, all records, include search history, no. Click on short names to select fields. All fields, OK. *Seems she clicked on select fields just wondering what it was, then felt obligated to change something, and selecting them all was the easiest thing to change.*

RT I'm going to hit print. But no records were formatted so far. So I did something wrong there. No, maybe not. *When no records formatted yet, she starts to BREAK PRINT, but she pauses long enough for the system to continue.* One record, here we go. Now if it hits more than 5 records formatted then I probably printed something I didn't want to. As long as it does 5, there are 5 that dealt with all areas concerned. It did 5, so I'm

assuming it is the 5 that were up here that dealt with all of them. [OK.] Can I see if that was right? [You can turn off the mic now if you're ready to stop.] OK.

Printed 5 of 5 so didn't have to discover how to select records.

QUESTIONNAIRE COMMENTS: Even though I knew this wasn't a test, I still felt some pressure, nervousness. I think if I was more relaxed, I would have played with the system more and perhaps used the reference materials supplied. Overall the exercise gave me a good idea of what ERIC does, some basic instructions on using it.

Session 3

Subject has Mac experience with word processing.

- I *Moves mouse as he reads introductory screen as you would follow print with your finger.*

OK. Well, I'm going to start reading these instructions so it'll take a minute. Uh, I'm going to search under the subject of obesity. I guess, um, I'll try "obesity in children".

- E *Some problem with backspace/delete. He finally figures it out. [Beep.] Um.*

- ? *I'm just going to search the topic obesity because, um, I don't understand what they're saying to do now.*

- L *Use of "in" caused system to expect a field name next, not another search word.*

- ? *Error message displayed, but he didn't understand it, so he changed to a simpler, one-term search. [Keep talking, tell me what you're thinking, what you're doing.] OK. Um, let's see. Um. I, I'm looking for articles on, on obesity in childhood, and I guess each one of these lines, the first two lines here I don't understand what they're about, but, I guess the third line is, uh, the citation for a magazine called Child Health USA, which sounds like it is going to have something that I want in it. AN and CHN fields are #1 and 2. The next article, um, maternal and child health services sounds like it might have something I want in it. The next article I don't understand the code though, you know, the letters. The next citation, I don't understand what that means, is either, um, let's see, maybe I'll read through these, I'll read through these search things at the bottom and see if I can make any sense out of it. Refers to each line as a citation. These are all fields within the first citation. Um, I'm going to click one of these articles and see if that's what brings it up.*

- E *Um, I'm going to click show records found and see if that will print the article out. I guess not.*

? Um, um, I'm not sure whether the machine has articles in it or whether it's just, um, or whether this is just a list of articles that I have to go somewhere else to find. Um, let's see. Something tells me I should be able to bring up the whole article, read the article, but maybe not. Maybe this is just a list of articles.

Ex I'm just going to, um, click all these various subjects at the bottom of the screen to see what they do, to find out what they do. It looks like next record, um, oh, it looks like there's, um, maybe 228 pages of records on this subject, and I've just clicked the third one, the fourth one. Hm. I wonder what select fields brings up. *He reads the list of field names, but I'm not sure he connects it with fields in each record.* Um. I'm going to cancel that, it doesn't, and try the next, I'm going to click search from records. And I'm going to click select records. I'm going to go back and read these instructions, and maybe I can figure out whether or not I'm just using, you know, a program that lists different articles or whether I can actually bring up the articles. I'm going to go back to the first page of, um, articles, of records.

RT [Beep, beep, beep, beep.] *No problem with mouse movement, but impatient and clicks several times while clock shows still working.* Now I'm going, I want to see this record, see if I can get the machine to print out this article from Child Health USA. And, um, I don't think it can. There doesn't seem to be any, um, I press select records and see what that does.

QR Hm, that didn't, I'm going to look in this, um, in this reference guide, and see if I can, um, find out whether this, um, search is just a list of articles or whether it actually prints up an article. [Tell me what you're finding. Is something there helping?] Um, let's see. There doesn't seem to be anything to directly answer my question. Um, whether or not I can actually bring up the article or whether I'm just dealing with something that, with a program that just lists articles. Um, I think I'm just going to write down, um, the first five articles that come up about children and obesity. Um, hm, OK. Oh, OK, the first thing that caught my eye on this first page was Child Health USA and, um, the reference guide says that's a title of an article, and gee. *By checking field names on reference guide, he figures out fields, almost serendipitously.* It's just thinking that, um, you know talking out loud is, uh, kind of confusing me. I was thinking if I had some peace and quiet I could figure out what's going on more. [Take your time.] Oh, OK. I'm going to go back

- and search, see if I can find a way to search, um, the subject not just obesity, but children and obesity.
- NE I'm going to try to figure out if I can, how to go back. [Beep.] *Tries PREVIOUS RECORD from 1 of 228 to get back. Jumps to search field by clicking in window accidentally.* I'm going to, um, type in erase. Now I'm going to try, um, the subject "child obesity". Hm. It says that, um, there's 228 records on obesity, 19000 on child, 228 on obesity, 1 on um child obesity, so we'll see if I can bring up that record.
- ? Um, let's see, um, it doesn't seem as though there's any, um, these lines, each line begins with some kind of code or abbreviation that, um, sometimes it's just not obvious what it means.
- QR *Still checking reference guide for field names. Not familiar with concept of fields?* Um, let's see. Since there were so many, um, records on children and there's only one on child obesity, I'm going to go back to obesity and, um, see if I can't, um, find, um.
- NE *Still trying previous record and up arrow to get back to search window. Machine beeps, but no indication of what is wrong. Again, he gets back by accident.*
- ? *From clicking in search history window, the search box shows "#1OBESITY". He gets error message and, without understanding the problem, erases it completely, and types in "obesity".* [Keep thinking aloud.] Um, yeah, I've gone back to obesity and I'm going to start the search. [Beep.] And, um, oh, oh, I pressed the wrong thing. Here, try this again. OK, um, it looks like all these different lines that come up about this record, I think they're all about this one record. Um, let's see. It says that, um, it says the title is Child Health USA '90, and I don't know whether that's the title of the article or a magazine. It sounds like it's the title of a magazine.
- QR And the next code, CS, I can't find that. And the next code, RN, I don't really see that, um, hm. *Refers only to reference guide for field names.* I'm just going to try to write down some articles, 5 articles that I think most probably have something to do with children and obesity, and, um, since the first one is uh from a magazine called child health, and I searched on obesity, there must be an article in there on child obesity. [I'm going to interrupt you here to remind you that I want you to print several records out.] OK, OK, OK, let's see. Where's the printer? [Actually, it's over there.] OK, OK, um, I'm going to print, uh, if I can figure out how, this, um, this article, let's see.

- How can I do that? Hm. There must be an easy way to get this printed out. Hm. *No use of menubar until this point.*
- UM *Opens manual, but sees thickness of it and closes it. Now checks under menubar items to see what's there. Hm. Sigh.*
- H *OK, I'm in, under help menu and I'm going to click Guide to ERIC and see what they say.*
- M *Trouble with secondary menus in Guide to ERIC. After several tries, selects getting help instead which has no secondary menus. Now I'm reading about getting help. Hm. Um, I'm just going to bring up this article. Under file menu I saw where an option to print came up, so, um, I'm just going to print one copy of it. Um, the printer has been initialized with an incompatible version of the laser printer software. To re-initialize and continue printing click OK. Oh, it looks like somebody already printed something on the, um, printer, so it's got to wait. Um, I'm going to break the printing and search some more articles and, um, come back and print it when it's, when it's, when the printer is free.*
- E *He is printing all 228 records, but he doesn't know it. Break print doesn't respond, so he keeps clicking, then tries moving the mouse to the File menu, but gets no response there either. It finally does break. Hm. It is usually easy to cancel printing, but it doesn't seem to be easy now. I guess it's starting the printing. OK. So I'm going to move on to the next record, 2 of 228. Um, it doesn't seem like there's anything about this type of title, this article having to do with children and obesity so I'm going to go on. Third one is not about children at all. Oops, 5th one, um, oh, frequency for childhood obesity, now this one is definitely about children so I'm going to print this one also.*
- E *He doesn't read the print dialog box. Message gets up to 13 records formatted before breaking print. Does he think it's printed? If printer were close by he would know. OK, my second article is being printed. OK, um, I'm going, um, to the next record, um, elementary physical education teachers' perceptions of childhood obesity. I'll go on, it seems as though there's quite a few on childhood obesity, and that one doesn't, oh yeah, the first five, I guess my instructions are to print the first five, so I'll go back to this. OK, and now I'm going to print this one, elementary physical education teachers' perceptions on childhood obesity. [Beep, beep, beep.] It says the printer is out of paper. [I can take care of that. Break in tape while I load paper.]*

- ? OK, so there's this, um, strange thing at the bottom of the screen about the records formatted so far, and I don't understand what that means, but anyway, um. I'm going to make sure that this article on elementary physical education teachers' perceptions on childhood obesity is going to print so, we'll go, hopefully to get that printed, and then I'm going to find two more articles.
- E *Break print again. Still formatting all 228 records. Breaks after 38 records formatted. Impatient with mouse, continues to click and look for other ways to stop print.*
- ? Oh, I see what this is. TI is the title and JN must be the journal it's in. But, again, it's just not really clear. I can't find JN in the list of abbreviations. Um, paper printer exit misfeed, um, yes, since the printer's not right here I can't really tell whether this is really being printed or not and now I've got a message that one page may be lost. Um, I don't know what to do since the printer's not right here, um. [I'll go check the printer again. If you'll just... *Break in tape while I correct misfeed.*] OK, the printer is being reset.
- ? I wonder what this records formatting this is all about. Um, I think I'm just waiting for the printer. Um, oh, ok, it sounds like it's just starting the printing job of this third article. And, um, this machine can't go forward until it prints, so I'm just waiting for the printing. [Beep.]
- ? Is it printing? [There are some documents printing.] Now there's another error in the, um, printer. Uh, and I don't know. [Just click OK on that.]
- S- *Printer error has numbers 495-1100. Absolutely no indication of where to go to find what that means.* [Let me ask you at this point, do you feel like you, that the items that you printed were, uh, sufficient to answer the question? It really doesn't matter if there were five of them. It's more a question of whether you found appropriate records.] Well, um, oh. Yeah, let's see, um, actually, now that I look at this a little more, it's not just children and obesity, it's actually about nutrition and exercise with children and obesity, so, um, the, uh, article on the, by the physical education teachers probably would be relevant to exercise and nutrition in childhood obesity, but these other two, let me go back and look at some of these other things that I printed out. I can go back to a couple and see if they are actually specific, specifically about exercise and obesity. Um, um, hm. Yeah, this first article might not really be directly relevant to nutrition and exercise. Let me keep

going forward to make sure that, um, I printed up something, this article here I can't even remember now what I printed out, which articles I printed out, but for sure this elementary physical education teachers article should be relevant to the subject of nutrition and exercise of obese children. Um, let me see titles of these articles quickly since I'm only interested in children's obesity and articles on nutrition and exercise. This one is about adults.

- L *Prefers searching 'manually' through 228 records. No idea there may be an easier way? If there was some way to limit this search to only children and obesity, I wouldn't have to go through all these 200 articles.*
- RT *Still not waiting for clock to turn to arrow, skipping records throughout. Uh, I'm on the 18th article and there's, nothing uh physical fitness as a mode for intervention in children. It doesn't say anything in the title that this is about obesity, but I assume it must be obese children because the search, I mean, I wonder how the search knows that these children were obese? Obesity is in boldface as descriptor. Descriptors list such things as children, nutrition, etc. but he is only looking at titles. That's right, I mean. Let me think. Nutrition, update infant, yeah infant's not really part of the subject. Childhood obesity related to TV addition. Um, hm. Hm, effects of physical educators' appearance of body fatness in communicating exercise concepts. That's not it. It's funny that the first one, those first few articles seemed to be about children and obesity. Hm. Well, this article doesn't seem to, energy expenditure walking with hand weights, doesn't necessarily, might not have anything to do with obesity. Let me go back to that one and see.*
- Ex *I'm going to, um, see what select fields means. Seemingly out of frustration, clicks on a field name within Select fields and gets description of AN, but not helpful to him--it's not anywhere near what he wanted to know. Hm. Sigh. Accession number is just in the prefix. Hm, yeah, uh, keep clicking through the articles.*
- ? *Yeah, it's just clear, you know, how to use this, um, how to use the search. It's just not simple enough. I've got all kinds of articles coming up that I really don't, I'm really not interested in for my search. I mean, I guess I would have to specify my search more, obesity and children. I'm going to go back, um, I'm going to go back and see if I can't, um, search a different subject, or make the search more specific. See this, um, this,*

uh, search history shows that there's only 1, um, article on child obesity, specifically. Um, I'm just going to go back and see if I can't, um, uh, I'm going to go back and see if I can't find another subject to search.

- E *Clicks within search history, not realizing they go into search field, then backspaces to erase.* Another way to describe this, um. I'm going to try childhood obesity.
- L Why would there only be one article in child obesity and 21 articles on childhood obesity? That just doesn't make sense. But anyway. [May I ask you a question here?] Yeah. [Why, um, if you searched child obesity, why then did you change it to childhood obesity? I mean, you did get more hits, but what led you to do that?] Yeah, um, I don't know. [OK, that's all right.] *He read it in the descriptor field in a relevant citation, but I don't think it consciously registered.* Uh, yeah, so, now if I can just bring up some of these childhood obesity articles and I still need to find 5 that I can use. And, uh, then I'll be done with my search. Now, just, I wonder what the next step is going to be. Uh, I wonder if I can just search this by number, I probably can. Number 8.
- E *Used Caps Lock to try to get # sign.* Hm. [Use the shift key and 3.] OK, I'm searching this by, um, uh, yeah, that's not working. I'm just going to type in childhood obesity and search that.
- E *Having trouble remembering to Show Records Found. Redoes search at least 3 times, expecting records window to just appear, I guess.* Hm. Oh. [Beep.] Type in a search request before starting a search. Hm. That's strange. Hm. OK. I guess they just want me to hit Show Records. So here's that one record that I think was from my last search on child obesity, Child Health USA 90. So I got that one. So, you say I don't need to print this out? [Why don't you try to print one more.] OK. So let's go through, I'm going to go through these a little bit, and see if they're all, all, in fact, on childhood obesity. Next record. A follow-up of family behavioral treatments of childhood obesity. That's not actually necessarily nutrition and exercise, so we'll go on.
- RT *Still not waiting for arrow. I don't think he's noticed clock icon.* Is childhood obesity related to TV addiction. Um, going to next one, because I'm more interested in exercise and nutrition. This is from a sports medicine journal. Is there a crisis in youth fitness or fatness. Elementary principals' perceptions of childhood obesity. School nurses' perceptions of childhood obesity. Concerns of the physical educator. Now that one may

have information about how exercise and obesity are related. Come on. Special reference break. Actually it would probably be better to search childhood obesity, nutrition and childhood obesity, exercise. If you could be that specific. *Perhaps if this weren't a controlled environment he would continue to refine search--or give up in frustration.*

- ? Oh no, this is just printing up all these articles that I'm not really asking it. *It's not printing at all. Why would he think it's printing?* Hm. Sigh.
- L I think that any articles, um, that are about childhood, if there's only 21 articles about childhood obesity, I don't think there would be any other articles with any more specific information like childhood obesity and exercise or childhood obesity and nutrition, so anything, anything, any articles I need must be included under this, this is a broader topic. Um, I'm going to go back and see if I can print, maybe go back and print this article, um. I'm going to print this article, prevention and treatment of childhood obesity. OK, so it's starting the printing.
- ? Still wonder what this records formatting, here. I don't see what's taking so long to print, unless it's printing a whole, I don't know if it's printing a whole article or whether it's just printing this bibliographic information about the title and the journal and the year of the journal.
- E *Appears to read print dialog box, but doesn't notice all records being printed. At least there are only 21 in this set. Again -- 21 records formatted and printed and he didn't notice. OK. OK, well I think I'm done. [I'll get you out of that.] OK.*

QUESTIONNAIRE COMMENTS: It was not clear to me if I was to print up references or not. Or, whether the entire article was on the disk or just a list of articles. There should be a description of how to use on the screen.

Session 4

This searcher has some Mac experience, but is just becoming familiar with it. She spent more time looking at the question than any others.

I don't know what the question is exactly, so I think it's what is the current thinking on teaching young children about nutrition and exercise. It's giving me an indication of kindergarten through third grade. I want to try to find out what teaching means in using ERIC, what they might use as teaching. Are they going to use instruction or educational something. Um, I

might, I wonder if I should look it up first or if I should just try it first and see if I get stuck and then look it up?

TH Um, well let me look it up first and we'll see what the descriptors are for teaching and obesity. *Using paper Thesaurus. Will be interesting to see if she later uses Index online.* OK, I'm not real familiar with using this. [You may have to speak up a little.] All right. [I know you're kind of thinking to yourself, but...] Educational courses, this could be, policies, educational counseling. I'm looking through here to try to find something that might, methods, that sounds good. Educational methods, teaching methods, practices, educational practices, related terms. Looking to see if there's anything else that might be a little more on target. What is the current thinking, I guess practices would be a good one. Oh, strategies might be good. OK, strategies looks even better. Oh, OK, it's telling me to go to educational methods, see more specific terms in instruction or training in the primary emphasis. So, I guess strategies rather than training or instruction. Interests, looking for instruction, but I can't really find it. Let's try training. Oh, I don't know if training would be it, because training could mean to become a teacher or something like that instead of to train others. Oh, experimental teaching. I like strategies so I'm going to go with that. Related terms and broader terms, educational planning, instructional development. Let's see if that helps me out. OK, do I have to tell you what I'm typing in? [Please.] I'm going to type in "obesity", uh, and, if I type it right, and I'm putting instruction, what is the term here, going to put the term in that is in here... oh, I just had it, "instructional developments". *No problem with backspace key to correct typing.*

St+ Do you push enter on this or start search? Start search, ok. Oh, looks like it's going to be a lot of records because it's taking a while. OK. Didn't get any hits, I guess I was too specific, but obesity got 228. Let's try obesity, I think I'm spelling it right. Obesity and instruction. *Retypes obesity, instead of clicking on #1.* Obesity and instructional, because, why not obesity and instructional techniques or something instead of developments. OK, got 6 hits, um. With 6 hits, I could probably look at them instead of going through pre-school, kindergarten through third grade, since there's only 6 of them. Let's see, I'm going to look at the records and see if I'm far off on what I'm looking at. A checkerboard approach, a culturally oriented program, I don't see if it tells me what ages or anything on here. That might be

too specific if I put the ages. Uh, next record. *No problem with mouse movement, does follow reading with mouse.* Oh, but these seem a little outdated. Educating students about obesity. Um, let me, let me look at some of the terms *they* might give me here, like related terms in these records that might help me. Wait a minute, let's go back to that last one. Practitioners. I'm going to start over. How can I do this?

NE *Trouble getting back, so checks under buttons, then file menu to restart -- doesn't look any further than file menu though.* Select fields, show subset, search from record, *hmm.*

Q Would the question mark help me? No. [Keep thinking aloud.] OK, I'm trying to find out how I can start this over.

? Oh, click on any word or drag across any phrase that you want to use in a search. It will transfer it to the find records dialog box. Click on any word or drag across any phrase that you want to use in a search. Oh gosh. I'm really not used to this Mac, how to do it, I don't know. Dialog box? Let's see. Print records, restart session. Well, I wonder if that's the whole thing? I'm just going to restart it, and see if I can start over because I got stuck there with something I didn't like. Sigh, OK. I'm going to try it again. Start it over. "Obesity" and, I'm going to put "teaching". I think I got too, I tried to do it the way I thought would be, the way I should do it, but I usually just go in and put any two terms in there. See what I come up with. 13 obesity and teaching. Since there's only 13 records I'm going to take a look at them. To see if it's, all right, the effects of a physical education, this is a good article, but it's for high school students, so I'll go through 13 and see if any are related to pre-school to kindergarten through third. Oh, well looking through these terms I saw learning strategies and obesity in here. That might be another way to look at this. I wonder if it would be a good idea just to use obese, instead of obesity, but we'll see. *Familiar with citation format, looks through descriptors.* This might be a good article, it says about nutrition. What's the current thinking on teaching young children. Um, please print out the first 5 records. I don't know if I'm supposed to look for the best 5 that I think are the best and print out one at a time, or if I find 5 all together print them out. [Either way.] OK, well I think this would be an OK article, so to print the record, I'll go up to print it, and see what it says. Citation only will be printed. I think that's all we need is the citation. OK. Push print to print it. Um, looks like it's OK. Zero records formatted so far, click the button to break.

- E *Finds print under file, but doesn't notice it will print all records. Does notice that it prints all 13. Oh, I guess it's printing all the records I found, all 13. I thought it would print the one that was on the screen at the time. Well, I'll print all 13, there might be another one I like in there. OK. Go to the next record and take a look at it. See if I like the next record. Looking at the next article, see if I like it. Got a lot of articles I don't really need from that print. I could probably use that last article, so that would be two. Um, not all of them tell you ages that the articles are related to when it comes to guides to classroom teaching. I would probably like to know if there's a way to, in the source, to tell you. Descriptors do indicate educational level and terms hyphenated to ease search from records, but you often have to click the down arrow to get them into the window. That one says junior high, that's not good. OK. OK.*
- NE *Restarts session again here. Show subset, select fields. Oh, show subset. That might tell me how to get back. Oh no, cancel that. Select records, search from records.*
- ? *Click on any word and drag it across. I just don't understand what this means. Click on any word and drag it across any phrase that you want to use in a search. It will be transformed to the find record diagonal box. Search from records explanation confusing, particularly because she misreads it. There are several Mac terms here that she is not familiar with. Where do I drag it? Click on any word and drag it across any phrase. That's probably how I start over. But I don't know how to. Restarting a session. [Keep thinking aloud. Tell me what you're doing.] Ah, I'm looking maybe to start over, and then I saw this search, if you read it it would probably help you out refining search, but I'm just going to start it over again and use these terms that I think are better, looking through the journal articles and they tell you some terms that were used. I think if I was going to do this I would have read the instructions before I started. Let's use learning, let me put a dash, strategies and obesity and, let's see, um, and I'm going to put elementary. Try it this time. I got one article. Probably too specific, maybe. There were only 228 obesity articles. I should be able to get something out of that one. Let's see, show record, one of one. That's the same article I got last time using those terms. Oh, let me just try elementary and obese.*
- NE *Restart session. Well, I have two articles. [Why don't you try to get one more.] OK. I've failed miserably. [No, no.] And, um,*

elementary. That's a lot of records for it to look through. Oh. OK, physical education, oh this is a good article. Can you print, let me look at the print to see if you can print just a certain record. Print records, options for print, highlighted hits, line long short none. Highlighted hits? I don't know how you highlight a hit on here. Print records, save records, I mean, I'm looking up, using print records, select fields, select records, page setup, options for print. Sigh.

- H *Checks under help menu, but doesn't select secondary menu that would have answered question of how to print selected records.* Wow, I don't want to print them all out, but I like that. Let me look up print records, it might give me an option to print, like 1 to 5 or something. Oh, selected records, oh, but that's not highlighted so I can't do that. Oh, start printing from record 1, OK, let me cancel and see if I like the other ones. Ok, these articles seem like they're a little bit better on target. Obesity wasn't really necessary, I don't think. Just physical education and young.
- E I'm going to print the first 5 because I need the last one. Do I need this one? The first 4 I think it was. OK, the first four. 1-4. I guess that's how you do four. [Beep.] [Keep thinking aloud.] OK, I put 1-4 with a dash, it doesn't want to do that so I guess, how about if I type to 4. *1 to 4.* [Beep.] It doesn't want to do that. Darn. Backspace again, print 1 comma 4, maybe that's it. [Beep.]
- S- *Lots of beeps, but no message to direct her to select records.* It didn't take the dash. Oh, well no, start printing records from number 1. Let me look at this little help. Is that a help button?
- Q *Does click ? icon, but expects context-sensitive help to just pop up. Gives up.* Hm, I don't want to print all those, all those 29 of them.
- H I'm going to go up to help to see if it can tell me something about printing records. No, it doesn't really say anything. Print records, use print records, selecting fields, selecting records.
- Mac [Since you're new on the Mac, let me help you out here a little bit. Go back under help. And come down to printing records, and that's a secondary menu, if you'll move the mouse over, and then select one of those.] Oh, OK, selecting records. Do it by clicking on any record number, in other words 3 of 28. When you click on a record number it is displayed in bold. Oh, OK, maybe I have to select the record. Do it by clicking on any record number, in other words, 3 of 28. When you click on a

record number it is displayed in bold. [Keep thinking aloud.] Oh, I'm reading it to make sure I understand what's going on. I don't know if it's telling me to click SELECT RECORDS every time I want that one to print. Let me try that. I have to close this window. Talk about being a rookie. It's, SELECT RECORDS. Select records by clicking on a record number, in other words, 1 of 10. Selected record numbers in bold type. Click again to deselect a record. It is not necessary to click the Select Records button before selecting a record. Oh, but where's the record number on here? Is that? Oh, OK, so that's how you do it. I wonder if this goes back. I guess not. Uh-uh. Let's just go through these records. I'm clicking on SELECT RECORD. I think that's how I can get it to print these. I don't want that one. This first one. OK. Now, let's see if I can print it. See what it says. Oh, OK, selected records are on there now. OK. So it should print my selected records now. It's just 4, or 3 of them now. Well, I caught on. It took me a while. That's 5. [OK. We can stop here.] You going to teach me on this now?

QUESTIONNAIRE COMMENTS: The system seems to have a lot of capabilities, but I didn't know how to use them. With some instruction and practice with the computer itself I think I would be much more successful. Hence, my opinion would change from frustrating and discouraged to satisfying.

Session 5

Mac experience, has a Mac at home. Search experience on ERIC, LISA, Library Literature, but all on PC.

OK, well, first I would search, I think, under obesity. Obesity, and then, oh, how do I do this? Type a search request and click start search. Where? Oh, there it is. OK. Now, this gives me my records immediately. Like, the other one, you know, it can keep going and gives you like a little time thing. This one will just bring it up immediately from the looks of it, I hope. And next I'm going to look for young children, er, uh, young people. I'm going to look under adolescents. Oops. I hope I spell it right, adolescents. Ha, I just spelled it wrong. OK, let's see, what, OK, um, what is the current thinking on teaching. Sigh. I'm going to combine one and two.

S+ *Types 1, clicks AND, types 2. System interprets as #1 and #2. One and two. See what I come up with. Ah, good, I got 11 hits. OK, um, and what is the current thinking on teaching young children about nutrition and exercise. Um, I do have a question about the search question. Is this all concerning one, or is this,*

I mean I'm concerned with obesity in young people, um, what is the current thinking on teaching young children about nutrition and exercise. Uh, this is actually what you want, this is what your concern is, this is what is prompting you to, this is what's prompting you to ask this question. [Yes.] OK, OK, OK, young children, preschool, kindergarten through third grade, nutrition and exercise. I think I'm going to search nutrition and exercise. Nutrition, ooh, I can't read. [I'm going to ask you to speak up just a little bit.] Nutrition, OK, exercise. I spelled exercise wrong. Exercise. Um, OK, I'm going to try it. I'm going to combine 4 and 5. 4 and 5. No hits. OK, um, hm. Nutrition and exercise. How about let's try. I'm going to try, just for the heck of it, call these up and look through them real quick.

Performs several single word searches, then combines with numbers. Except for I don't know how to do that. Well, let's try it this way. I'm not familiar with this. SHOW RECORDS FOUND . OK, that's what I want to see. 11. This one is younger children. See, I thought young people, I put adolescents, but you're really talking about young children. I think I'm going to go back. Previous record, next record, select field, search from records. Oh well, maybe next record. Determinants. These are too old. Previous record. Oh, select records. Let's see, where do I want to go back?

NE How do I get back to where I was? Previous record. Come on.

S- [Beep. Beep.] What's that? Search from records. Select fields. No, I don't want that. OK. Huh, OK. *When trying to go back, looks under buttons, then tries previous record until Beeps. Finally closes window to get back.* OK, preschool, sigh, let's see, K-3, let's try, preschool, oops, preschool, what am I doing? Um, huh, I don't know, can you search, like, K through 3? I don't know if you can do a search like that? [You can try it.] K, I don't know, I probably doubt this, K through 3. I don't think it will know what it's talking about. Grades K through 3.

S+ I keep wanting to hit that return button. *I don't think she's noticed that she has alternately hit the return key and the start search button, and they both work.* Huh, well, great. Oh now, here's where it will say. OK, it came up with a big zilch. OK, let's try, OK, let's try, how did I combine those before? Number 6? Yeah. 4 and 5. Number 6, um, and 13. Zilch, OK. Um, hm. [Keep thinking aloud.] What is the current thinking on teaching young children about nutrition and exercise? I'm going to try young children, what the heck? Young children. Young

- children. Now, I'm going to try 17 and whatever that was. 17 and 6. Still going.
- L 6 and 13, 17 and 6. 6 had no hits, so she'll get no hits on any combination with 6. Hm. OK. So let's do young children, 17, and number 6, yeah, number 6. Sigh, big fat zero. OK, um, let's try, nutrition. Hm. Let's try education. Education and nutrition. Education and nutrition. This is what I mean where I sometimes, I just go for the obvious and then after that I'm not sure. You know? Uh, that's why I don't think I utilize it the way, you know, completely. Oh my god, it's only 17. *Only 17% complete.* Come on. Obesity. Sigh. Oh, god, come on. I'm going to quit there. *Breaks search at 726 records.* Um, OK. Well let's try 21 and 17. 21 and 17. Hm. So far a big zilch. Education. Hm, OK, try teaching and children, teaching, exercise. Well, it looks like we're coming up with a big zero. Of course, I always hold out. I must be searching under the wrong thing, because it certainly seems like there would be something, material, you know, on educating young children on nutrition. Hm. OK, let's try, we're not finding anything on this, go on with this line of thinking. Um, OK. Let's see what else we can do here. Um, nutrition, exercise. Well we're not going to be able to teach them anything. Let's look under teaching.
- TH *Looks at Thesaurus.* How does this thing work? OK. Teaching. Education. Oh, grades, higher education, high school. Let's look under, hm, I don't know how you, grade, grade, OK, here we go. Elementary education. Sigh, let's try elementary education I guess. I don't know. Elementary education. Oops. Elementary education. Let's see. Let's try 20, 25, I'm sorry. Now, I don't know what these things are. What does this stuff mean? BT, broader term, related term. Oh, OK. *Checks front of thesaurus for meaning of abbreviations.* Primary education. Oh lord, this is going to come up with a zillion.
- L *Breaks at 8000 records, but then combines with #6 which had no hits.* OK, let's try 25 and um, gee, what was that one, 6, I think. Instructional program division. Looks like I'm not going to find anything there either. OK, what is the current thinking on teaching, hm. How about teaching? Another way to say teaching. Teaching. Teaching methods. Teaching guides. Teaching. Instruction, teaching methods. Oh, teaching methods, maybe. Let's try that. Oops. Teaching methods. And, let's try that. Probably come up with a big zip again.
- L *Again uses 6 in combination with teaching methods.* Teacher placement, no, no, no, no. Teaching methods. Let's go under

teaching methods here. Ways of presenting, search on activities, integrated methods. Ooh, integrated methods. Subject methods. Oh, I wish I knew more about teaching. Um, hm, creative teaching. Educational methods. Classroom techniques. Instruction? Teaching models, no. Probably come up with a big fat zero there. OK, let's try. What did I see here that looked good? Um, current thinking on teaching, current thinking on teaching. There's a word in here, but I'm not getting it. My head is full of cold. Um, educational strategies. How about that? Let's try that. Educational strategies. Um, oops, spelled it wrong. Strategies. No, strategies. Let's try that. Educational strategies. I'm sure this is going to come up with a million. Sigh. I'm not real good at narrowing it down. You know, I could always figure out the, um, you know, sort of like the key search words, but then when it comes to, you know, like, the whole, you know, like, the current thinking on teaching, then that's where I am unclear on how to search, or how I would search, so it's just hit and miss. Obviously. Ha, ha. OK, let's, I hate to quit these because it's, like, I figure, like when it gets to 75% it might be the one I want, you know.

- TH OK, education strategies, teaching guides, no, teaching models, no. Teaching practices, no. No. Let's look under, I don't know if that would give me anything. Look under nutrition, but I don't think it's going to, I don't think it goes that way. Nutrition. Nutrition, nutrition, see if there's another way to look for nutrition. *Again, while waiting for search to complete, she is perusing thesaurus.* Ah, health education. I like that. Do you like that? [Ha, ha.] I kind of like that. Let's quit this.
- L OK, let's try, uh, OK, let's try 32 and my good old number 6. OK. I'm sure it will come up with zip. Something, something's not jiving between those 2. I don't know what it is. It seems like that would be a good indicator, those 2 together, you know. Teaching methods and nutrition. Well, wait a minute. I have nutrition and exercise. What's number 6 again? Diet, nutrition. Nutrition and exercise. [When you break here, why don't you scroll up and look at number 6.] OK. Crud, I'm not finding anything again. Health education, I like that. It's a little more, clued into this. All right, forget it. I'm giving up. Yeah, nutrition and exercise. That's number 6. OK, let's go back to where we were. OK, let's try health education. *When she scrolls up to look at 6, it's a combination of 4 and 5 -- nutrition and exercise -- 4 hits on this misspelling of exercise.* Health education, health education, health education, and, I wonder if

I'm using the wrong terms, combining terms, or health education or, another term, let's get rid of that. Health education. and #6.

- L *Still combining with 6. Didn't notice logic error of using line # with no hits.* Well, OK. Quit it. OK, I want health education, let's see, number, OK, 36 and, where do I have, grade? K-3, um. 13. Hm. So I want 36, 36 and 13. [Can I interrupt you for a minute here? You have a flaw in your logic that's really hanging you up.] OK, that's what I was, you know, I know there is, but I just don't know what. [This column indicates how many records were found. And anytime you combine something with zero hits you're going to get zero hits.] Exactly. [So, for number 6, you had zero hits under nutrition and exercise, although if you'll go back, you'll see that on a previous search you misspelled exercise, but you still go hits on it.] Oh. [But, what I want you to notice here is that any time you combine something with zero hits, you're always going to get zero hits.] Exactly. OK. So don't even use this number 6 in other words. OK. Now, let me go back there and look. Oh god, I didn't even look at that. How smart. Um, K-3, see there won't be anything there either. Young children. well let's try young children, 17. 17, and, what was the other one? Education and nutrition, 21. Darn. That's what I hate about logic. So logical. Oh, come on. Sigh.

- TH Um, nutrition, eating habits, oh, nutrition instruction, I like this. OK, forget it. *Break search at 16%, zero hits, because she finds something in thesaurus she likes better. Frustration? Or general impatience?* Nutrition, nutrition. when I use two words like this, that's OK, right? Instruction. I mean, I can do that? [It appears to be working.] OK. I mean, it has two words here. It just puts them together? OK, nutrition instruction. Oh, thank god, I'm getting something. OK, nutrition instruction. Let's see, nutrition instruction. Now, how do I get exercise. Let's see if I can get exercise here? Exercise. Oh, I'm more clogged up than I thought. Exercise, exercise, exercise. Hmm, I don't like any of those. OK, nutrition instruction, I got something at least. Um, what do I want? Uh, 41 and, do I have young children up here? Yeah, young children, 17. Let's try that.

- E Oh, poop. It looks like we're going to get a big zilch here. Crud, I can't believe this. *She actually got 17 hits on 41 and 17, but didn't get them until the last percentage of search.* OK, let's go back and see what we've got here. Education, nutrition. Obesity. Sigh, obesity and young children... Let's try that, what

- the heck, it can't hurt. Obesity and young children. 17. OK. After I'm done with this, will you tell me the error of my ways? [Yes.] Thanks. *She had expressed frustration before this session began over a search she was conducting for a class where she was not having any luck. Logic and search strategies would be good tips for her.* Sigh. I know there's, um, there's strategy to search, I'm just not, I haven't used it that much to, to um, to play out those strategies first. I've just used this a couple of times. Oh man. OK, something's wrong here. I'm using the wrong, uh, oh, wait a minute, I got four. Let's see what we've got. [inaudible reading of citation information] Can I get a print of this? *Either she didn't read the instructions carefully or she's totally forgotten the instructions after her search difficulties.* [I'd like you to print, say 2 or 3, but no more than 5.] OK. All right, how do I print? Print records.
- E *Easily goes to File menu, changes to start from record #2. It printed 3 of the 4 records, but she didn't notice. I just want record 2.* Now, OK. OK.
- ? What does this mean? Zero records formatted so far, click the button to break. Oh, it started, OK. Um, let's see what it says here. Early childhood, nutrition, physical activity, physical development, eating habits, physical education. I want to get that one printed. OK, that looks like a fairly decent one, too. I'm going to do that. Print records, I just want number 3.
- E *Selects start from #3. I want, oh, OK, I want, 3 to 3. That's all I want. In LaserWriter dialog box selects print from page 3 to page 3. Still prints 2 of 4 records.* OK, um, OK, I don't like that one so much. OK, let's go back. Um, can I get that copy? [Uh-huh. If you feel like you've printed a couple that are good, um, to answer the question, that's fine. You can stop if you like.] OK. I guess, um, I want to look at some of the other fields they have and see how to combine them. If there's a better, something, you know, because I want to get the teaching methods down. [OK.] *Here I go to get the printed records.* OK, let's go nutrition instruction and obesity. Nutrition instruction. [Here you go.] Oh thanks, let's see.
- E No, shoot, this doesn't tell me the whole thing. *Retrieved printed records, but they don't include descriptors.* Because I want current teaching, I want to get that in here somehow. Um, teaching methods, educational strategies. Let's try that again. Educational strategies, 32, and, um, uh, 41. Sigh. Educational strategies and 41. Let's see, let's try that. Forget it. *Continues to break search before complete.* OK, let's try,

educational strategies and, um, obesity. Educational strategy and fat kids. Gosh. Nutrition instruction. Eating habits. Oh, I'm not finding anything. These seemed so good. Objectives. Goals, objectives. Teaching nutrition. OK, forget it. Forget it, forget it. OK, let's go for, OK, what's the current thinking on teaching young children, teaching young children, uh. I don't know. I'm going to just, primary education and, nutrition? [You've printed several records. If you are ready to stop, I think you've completed the assignment. But it's up to you. If you'd like to keep trying to narrow your search...] I just want to try one more thing. This is making me mad. Nutrition, nutrition, OK. Oops. Exercise. All right, now let's try something else. And, and, OK, let's try primary education, 38, with nutrition, 49, and, exercise, 50. And I'm quitting after this if it doesn't come up with anything else, because I don't know what I'm doing wrong. Learning processes, ooh, that's good, learning processes. Well, it looks like we're not going to find anything. See I'm not sure how you, um, yeah, I'm not real sure how you put all this together. With teaching young children. All right, forget it. I'm not going to find anything. OK.

QUESTIONNAIRE COMMENTS: None.

Session 6

Very little Mac experience, not comfortable with the platform.

QR *Made notes on page from own ideas then checked quick reference card*

TH *and thesaurus under nutrition (2 matches: obesity and nutrition information). "I've put it off long enough, it's time to start", she says as she turns to the computer. Just glanced at the screen before going to the reference guide.*

[All right.] Problem with tape on this interview. She first searched nutrition instruction and children. She was a little hesitant with the mouse, but she reaches for it readily to click START SEARCH. No problem finding Show Records Found button. [OK, pick up right where you left off.] OK. You are what you eat does not necessarily deal with educational practices. We'll try again here. Cooking in the classroom. We have 99 hits on this search. And, I think the problem here is that it's much too broad. I've got to zero in on obesity somehow. Part of the problem here is figuring out, of course, which is why you're having me do this thing, what the correct combination would be to narrow it down. Um, one of the things I'm not sure about because I've never worked with ERIC before

is whether I can combine ~~more~~ factors in the search. In other words, I've got nutrition instruction and children. Uh, I'm not sure whether I can do nutrition instruction and obesity and children. Uh, or the other component of this was exercise. Uh, but I think instead of whipping through 99 of these things, which would take forever, ~~that~~ I need to try something else. Now, I have to figure out ~~how~~ to do that. Hm. Ha, ha. Which, of course, would be kind of handy if I knew how to work the Mac and I suppose I could go to the guide here. But, well, I'll just try getting out and see what happens. I'll probably louse up the whole thing.

NE *Clicks apple on menubar when trying to get back.* No, I'm not going to mess with that. ~~How~~ about SELECT FIELDS again and see what happens. That's ~~not~~ going to help me either. Back to Search and see what that ~~does~~. Click on any word or drag across any phrase that you want to use in a search. Sigh. That's not going to work.

H Let me go up to help and see what that says. *Bypasses secondary menus in help, to go down to restarting a session which directs her to File menu.* Oh, restart a session here. Sigh. On the file menu. OK. We have the little clock, oh here it is. *She waits patiently -- not nervously for restart.* I'll try another search and see what happens. Whether we get a better representation here. [Tell me what you're typing in.] Trying to do nutrition instruction and obesity and children. And see what happens. Last time, without the obesity in there, I got 99 hits. And they were all over the map. A lot of stuff, basic nutrition in school, you are what you eat, that kind of thing, which doesn't zero in enough. Now we still haven't hit exercise or physical fitness.

? What happened, it went off the screen here, it doesn't show anything. [Keep thinking aloud.] *Search completed, found 5 records, but she doesn't remember to Show Records Found.* Well, I have no idea what just happened. It was showing the percentage searched and then all of a sudden there was nothing on there. I may have done something with the mouse. Probably did. Uh, it's not doing anything at all.

Q Therefore, I'm going to go over here to the big black diamond with the question mark in it and see what happens. Nothing happens. Ha, ha.

N+ *Clicks on ? icon, the re-clicks to get cursor arrow back.* All right. It's showing me to do the enter search again, at least that's where the little marker is. So there was something that

didn't work out on that one. Um, if I just go to obesity and nutrition instruction, and forget kids for a second, we're going to probably get more hits again. Um, but wait a minute. Up here it was showing that there were 5 records on nutrition instruction and obesity and children. As opposed to 40,000 plus for just children, so, I guess all the blank means is that it finished the search, and I just wasn't paying attention. I want to show the records found, but I just want to show for number 5. Hm, well let's try this and see what happens. OK. All right, childhood obesity, concern for the physical educator, that sounds good. That does the trick very nicely. Let's see what the next one is. Intervention for obesity, current approaches. I'm looking right now to see whether it deals with phys ed as well as nutrition. 1 out of 2 so far. Overweight children and phys ed. There. I think we've got our hits at this point. Um, let's try the 5th one. Yeah, those look very good. And, I think, let's see, my instructions here are to go ahead and print 5 records, and I've got 5, and I'm just going to go for it. As soon as I figure out how to print. So, um, now what? It's probably one of these functions. I remember that from, there it is, that ought to do the trick. Select fields, all records, start printing from record 1. Since we're just printing the ones I retrieved and I only retrieved those 5, I don't have to worry about the other 40,000 plus that showed up on the initial search screen. So it's going to the LaserWriter, and one copy. Looking for LaserWriter. Oh, OK, they found it. Got the 5 formatted, and I'm assuming that it's printing out. Somewhere, on the other side of this screen. OK, then that should be it. *Prints total of 5 records retrieved, so no need to select records.*

QUESTIONNAIRE COMMENTS: My lack of familiarity with Macintosh limited my enjoyment of the exercise, but I liked the logic of the system, its speed, and the ease with which it progressed from one function to another after I had figured out what to do.

Session 7

No Mac experience. Not familiar with ERIC.

[You may clip this mic to your jeans or leave it in your lap or on the table, whichever is more comfortable to you.] OK. OK. In order to, um, search on obesity in young people, since I'm not sure what they mean by young people, I'm going to start with obesity and children.

M *Readily reaches for mouse, but a little slow with moving it. And the results for that was 68 records for obesity and*

children. [Keep thinking aloud.] OK. Next, I'm going to try obesity and adolescents. *No problems backspacing to correct typing errors.* And there are no search topics, or no records found for obesity and adolescents. So we're mainly stuck with the 68 records on obesity and children. So, we'll see. [Keep thinking aloud.] We probably should go ahead and display what the 68, at least part of what the 68 records say about obesity and children, at least some of the headlines. How do you display the records after they are found? [Are you familiar with the menubar on the Mac at all?] No.

Mac [If you'll move up, for example, to Help, and hold the mouse down. It will show a pop-up menu, and if you'll come down to Showing Records, there will be another menu here on the right, and if you bring the mouse over and then lift the clicker, it will give you instructions on that. Each one of these items will have a menu underneath it that you can bring up.] Oh, OK.

H *Familiar with close window, from help window, so she may not be as much of a Mac novice as she says.* OK. [Keep thinking aloud. Tell me what you're doing, the logic you're using.] OK. In order to show the 68 records for obesity and children, we needed to go back and retype the search again, and now I'm looking at the retrieved records, and, looking to see what, some of what, um, the records have to say about obesity and children. Oh.

N+ *Uses down arrow to review record, to exclusion of Next Record button.* [Keep thinking aloud.] OK. I am still looking at some of the records to see what they have to say about childhood obesity and if, and if most of these are what the, um, person who asked the question really needed, if the information is actually reflective of what my search strategy was. I'm hitting the SELECT RECORDS bar. [Keep thinking aloud, what are you looking for, what's your next step.] Since most of them tend to have what we need, it might, I don't think it would be advisable to go ahead and limit the search because most, it tends to be pretty limited on its own. [Keep thinking aloud, are you looking for help on printing records?] Yeah. Well, we'll just go ahead and get out of looking at this and look for the nutrition and education and children.

NE How do we just get out, out of this application? Or do you have to print? [You should find some guidance there in the help. If you go under Finding Records, and maybe Narrowing a Search or Clearing Searches or Lateral Searching, there could be some

- ideas. Or you could check under the different menus here and look under and see if any of them give you some ideas.]
- H OK, I've gone under the Lateral Searching in the help bar. *Typical trouble getting back, perused help and viewed a few secondary menus. I tried to be as vague in order not to directly answer her question, but she is clueless as to what to do next. No attempt to use paper sources. No attempt on her own to look at ? icon or at help even after I first pointed it out to her. This is a very passive searcher. I bet on her own that she would give up and go to paper -- or seek help? [Keep thinking aloud.] Well, Lateral Searching isn't what I need. OK. [inaudible, perusing help.] [Keep thinking aloud. You're Clearing a Search.] So, we'll go ahead and search with nutrition and education and children. And see what that brings up. There were no records for that, so we'll just try nutrition and education.*
- E *Broke search of nutrition and education and children saying none were found but search hadn't finished. OK, there are 100, possibly more than 125 records for nutrition and education. So we are going to have to limit that, however, nutrition and education and children is not listed. So, [keep thinking aloud.] so, hm, let's see.*
- TH I'm going to look in the EPIC, er, ERIC Thesaurus to see if it might be, if there's a different word that I should use instead of just children. We'll go ahead and use kindergarten and children and the nutrition and education search from before. See if there's anything that comes up with that. [Keep thinking aloud.]
- E And with the search being 34% complete with no records, I doubt if there is anything there under that heading, too. So, [I'm going to interrupt you at this point. Rerun number 4 and let the search complete all the way, instead of breaking it before it's found records.] OK. *Knowing that searches have only been showing records near 100% completion, I was afraid this could go on forever. Researcher impatience a minus in this type of study. [Tell me what you're thinking at this point.]*
- RT Well, it took quite a while for it. [Was that frustrating or did it make you nervous that it wasn't going to find anything, or?] It did, because, I'm used to having things come up automatically. I'm not used to waiting until a search is over 25% complete to have it come back and tell me that there's anything in there. I realize that might be just a time lag, but, like, I made the wrong assumption when nothing came back. I'm not used to

having that in there. So, I think that's one of the limitations of this, if you're not used to have something like that, and having to, I'd rather have, have the, um, have some indication that it's still working, but yet, you have to know that there's at least something in there on it. Sigh. Well, there were 496 records found for nutrition and education and children, which is a lot better than the zero I got before. So that makes me wonder if there isn't something on teaching kindergarten children nutrition and education also. And we just need to wait until the end of the search to find out. Because we only stopped at, uh, 34%. [So you're going to rerun that search.] Yeah. And just let it go all the way out, for a more accurate count. Since I now know what the database, er, the program does. *This subject is unusually quiet.* OK, well, now it's confirmed there are no records under kindergarten and children and nutrition and education. OK, let's see.

- TH Consult the trusty thesaurus again. [Tell me what you're thinking.] Find out, maybe, elementary aged children. Hm.
- L Try elementary, education, oh wait, elementary and education and nutrition and education. See what that search brings us. While that's trying to find it, I think I'll look to see, there might be something under elementary school curriculum. Let's see. [Keep thinking aloud.] Well, since the person wants current thinking, and we're getting a wide number of records, you might want to limit using publication year. That way it will allow us to get more current, being defined possibly as the last year or two.
- QR *While searching elementary and education and nutrition and education, looks over quick reference guide about limit by publication year.*
- RT *As the search grinds on, she taps the table impatiently.* [I didn't mean to scare you from breaking a search. If you feel like you have too many, and you don't want to wait anymore...] No, that's OK. I just didn't realize that was, um, the way this database works. I'm also wondering if elementary education is just a little broad.
- E Let's see what it does if we put, let's see, publication year 1992, go ahead and say publication year 1992 and the previous search which was elementary and education and nutrition and education. *PY=1992 and 18.* And, we come up with zero. *Database goes to September, 1991. This is underneath the menubar area, but she hasn't read it.* OK. [Keep thinking aloud.] Let's see what publication year 1991 is going to say,

along with elementary, nutrition, education, elementary schools. *These are not new search terms, she just says them differently.* Yawn. [Keep thinking aloud.] Hm. Well, there's at least some. And, I find it somewhat interesting that, either there wasn't anything written about nutritional education in elementary schools this year so far, or since there's been all the recent advertising for fitness in schools this year, I just find that interesting that there's zero here so far.

E I'm going to wait until this gets up to maybe 50% and then we'll break it. OK. So there were four records found for 1991 for elementary education and nutritional. I think that elementary education would cover at least kindergarten through third grade. It might be a little more. [Don't focus on the fact that you have to get five. If you get less than five and you feel they're appropriate, that's fine, you can print those.] OK, so you wanted five from each section then. [No, just if you get some, I'd like you to print several records, no more than five.] OK. [But if you find four, that's OK. It all depends on how your search goes.] Right, OK. Well, before I print anything I just want to go on to education, er, exercise first.

L And I'll just put exercise and education and elementary and education. Since this search request was also for nutrition and exercise, we might as well see what the database has for the exercise education and elementary. OK. OK, the search at about 25% complete and there are 128 articles, so we'll limit that with publication year equal 1991 again. See how that works. OK. Let's see, at 30% search completed we got 9 articles for 1991 publications of exercise, education, elementary, and education, so at this point, it would probably be best to look at some of the articles that we have pulled, or some of the records we pulled up. The first one will be nutrition, 1991 publications of nutrition education and elementary education. I'm going to SHOW RECORDS FOUND.

RT Sigh. It's taking a long while to pull up 4 records. I wonder what the problem is.

S- *Message is: Retrieving record, please wait. It is taking a long time. No indication of why or % complete. She's very frustrated.* Sigh. I'm thinking we should keep narrowing it down, since you have to put the phrase, you have to re-type, in order to use previous records, you have to start the search over again by hitting the line number from the windows menu, so number 4, SHOW RECORDS FOUND, and we're getting this message which isn't helpful. This isn't a good one for an

impatient person. Ha, ha. Hm. [If I weren't sitting here, what would you do right now?] Break it, and go on to the next one, at least, although the patron really wants it. I'll go ahead and break it and see if the same thing happens with the, um, exercise one. And for this one we'll have to wait because we did a complete search the last time. In order to. Sigh. [Why don't you go ahead and break it and see if you can show some records from number 3.] OK. [Why don't you print, say 2, any 2 records from that search.] OK. *She read Select Records information. Again use of arrow keys as opposed to Next and Previous buttons. Finally does use Next. Does highlight document #. Use of arrows delays cursor return to arrow, she shows some impatience there.* OK. The, um, record that I selected that was a conference paper having to do with various health education topics for the elementary education group, and it also had to deal with physical and exercise. [Why don't you print one more.] OK. Hm. OK. The options for print. [Keep thinking aloud.] OK, I'm looking at the Options for Print, but I'm not finding any help. I'm looking to print the record. *Checks under Using Print Records.* OK, print records, you need to print selected, selected records default, we'll go ahead and print. We want one copy, cover page, OK. *Worried look at zero records formatted, but she waits.* OK.

QUESTIONNAIRE COMMENTS: The system is very limited especially when someone prefers to view previous search results and the system needs to go through the entire search process again. To me, this seems rather slow when an individual can search online in several minutes.

Session 8

A lot of search experience, has been on CD-ROM development teams before, but has never searched ERIC on the Mac.

I *Thoughtful read of question and introductory screen. Asks if there is a native mode to interact with software or if find records dialog box is the only way.*

Um, when I look at the question, I see two parts to it, and if I were going to start off before I even went online, I would want to, umm, conduct a reference interview because nutrition and exercise is one idea and obesity and children is another idea, and I would want to know if the user or the patron was interested in nutrition and exercise addressing the problem of obesity or if there are actually two different questions. Because nutrition and exercise and children is going to pull

down a lot of stuff on children's sports and sports programs in elementary schools, and obesity and children is going to pull down nutritional information and special problems of the obese, for instance, health problems. And so, there are two questions imbedded in the question as it's posed. Um, in the absence of a, uh, reference interview and just taking the question the way it's stated, uh, I think it can be addressed as searching for nutrition and exercise and with the age range as specified. Um, since I haven't used ERIC, at least the descriptors in ERIC for age ranges, I'm going to use the reference material to figure out if there's, um, an index category for that age range. I know that National Library of Medicine Medline uses one, I don't know if ERIC uses one. Nutrition and exercise ought to be pretty obvious.

TH *Reads through intro to Thesaurus to get age level descriptor.* OK, the, uh, indexing information tells me that they do have age level descriptors. Uh, and that the age level descriptor for children birth through eight years is young children. So it would have to be young children not, let's see, young children not infants. Because that would pull together pre-school children ages one through five and young children through eight years old, and eight years old is about third grade. So the age range statement is young children not infants, um. If, possibly, depending on the reference interview, rather than, um, age level descriptors, I might go to an educational level descriptor, uh, that would be primary education because that pulls together pre-school and kindergarten through grade three. So it would depend on if the bias that I got from the reference interview was, age was important or the educational level was important, uh, would be which descriptor I would choose to use. Since the point here is pulling as many references as possible I suppose it would be best to use both of them. So, young children not infants or primary education. That pulls together the age range.

TH And, see what the thesaurus says about nutrition. OK, again we'd have to go back to the reference interview, because under the general heading of nutrition, there are, um, separate categories for breakfast programs, dietetics, eating habits, uh, nutritional instruction, obesity, uh, physical health, and so, if we use nutrition as a super term, uh, it will pull in the obesity arguments. And, let's see, exercise. OK, exercise is a heading, too.

- E Now, let's see. I'm looking at the software to see if there's a way to, um, access the inverted indices to see if this particular load of ERIC has hierarchical, or has the thesaurus terms underneath the subject heading terms, and I don't see anything except, um, search enter bar, and start search, and the Boolean and proximity operators. Let's see what help does for us.
- M *Initial trouble getting to secondary menu in help, but he gets there.*
- H *Note that help is the only menu he looks under.* Hm. I was looking through the fields to see if there's a way to expand the fields, and there doesn't appear to be, so, let's start searching and see what happens. [Tell me what you're typing in.] Um, just the first search term, young children not infants.
- S+ *Does click on NOT as opposed to typing.*
- S- OK, the interaction might not be, uh, so good here because it looks like it's searching for single word postings rather than young children as a heading in and of itself, even though it's a heading in the thesaurus. Now I'm just waiting for the search to complete. And now I'm going to enter the second term that I decided on for the age range, and that is primary education, so add that using OR logic. *Clicks OR, types primary education.*
- S+ *System adds #4 (previous search) to the beginning of this request.* Now I'm just waiting for it to grind through the search. If the, uh, database isn't set up the way I expect it to be set up, in other words, if nutrition isn't a super term, and if, uh, exercise isn't a super term for all of the thesaurus terms listed under it, I would probably expand the search, and type in all of the terms that I had gotten from the reference interview plus anything else that looked like it might give likely retrieval.
- RT It's taking a long time to complete. If I had to do this a lot, I think I would be impatient with this application. Gee, I have time to get some coffee. I suppose I get spoiled with online systems. I can just type a whole logic in one line, and you don't have to worry about single postings. [Outside of this experiment, when would you consider breaking the search, or would you?] Um, in this particular case, I probably wouldn't break it, because of the fact that it's necessary to collect all the age range papers and then whittle it away with the application search terms. And so I probably would put up with having to wait so long for it. Usually I would break a search that was thrashing for a long time like this if it was becoming obvious that I had ill-selected search terms, that the retrieval was

going to be so massively large that I had picked the wrong thing, that I had just guessed wrong. In this particular case, the number of postings as it's rolling up there doesn't look like it's excessive and in a second I'm going to use AND logic to narrow, but if it was blowing up, like hundreds of thousands of records I would break it off and try for something a little more surgical. Also, this is CD-ROM. This is here. I'm not paying online charges or anything so it can sit there and grind, and it costs the same to sit there and grind as not. Now if this was BRS or DIALOG or something, I'd have been gone a long time ago.

? It seems to be done, but I don't have a cursor back yet. This is the experiment to see if "and nutrition and exercise" gets the cites I'm expecting. If the answer set is too large, I would consider adding "and obesity" to narrow it down to more of the exact parameters given in the original question.

TH In the copious free time the search allows, I'm going to look at the index again and make sure I've done a good job selecting search terms. *He means thesaurus*. Since all of the terms that we've considered are narrower terms under the broader terms in the thesaurus, I am presuming that if there are records out there that talk about nutrition and exercise and either primary education or young children not infants that will hit on them. Now we won't have to go to the narrower terms because if it's set up the way the thesaurus says it is if you use a narrower term rather than a broader term, you won't get any hits anyway. If, on the other hand, it doesn't hit, we'll have to go to broader terms. I'll be prepared for that. OK, broader term for exercise is physical activities. Nutrition doesn't list a broader term. My retrieval seems kind of sparse. I think I'm going to try the broader term for exercise anyway.

S+ *Types in #7 instead of clicking*. So I just type in, restate the search. Number 7 is the search for the age range, the search statement for age range, and nutrition and physical activities, which is the broader term, and see if we get, what kind of retrieval we get. And again, we have a period of leisure time here. Sigh. *Can't tell if he is frustrated by slow search time or if he is just being a good volunteer*.

S- I'm speculating on the architecture of this particular product that rather than combining pointers from the inverted indices to determine record numbers, and then only going to the disc, actually searching the disc at display time, that this particular architecture scans the entire disc for every query. It's kind of

a goofy way to do it. It makes me reluctant to do the logical last step of this search which is to say, uh, search statement ten or search statement fifteen which offers insurance that in case somebody messed up at database construction time you don't lose any postings. Since physical activities is a broader term for exercise, there shouldn't be any in search statement fifteen that's not in search statement ten. On the other hand, since the database is put together by human beings, there just might be, and so, the best way to finish this search would be search statement 10 or search statement 15, but if this particular application is going to seek the entire disc again, um, to combine the 6 hits I got with search statement 10 with the 6 or 8 that I presume I'll get from 15, then it's a disincentive to use the product. Probably it's a disincentive to use it the way it's intended. OK, there's only 3 of them. Just combine line 10, the hits we got with exercise, and line 14 which is 3 we get from physical activities and nutrition, and hope that it will do this smoothly rather than have to flog the whole disc again. #10 OR #14. No, it's going to flog the whole disc again. Since I'm not going to do anything else, and since it's going to take a long time, can I go get a drink? I'll be right back. [Sure.] *Break in tape. Note that the search is still continuing when he returns.*

RT If this application was a little bit faster and a little bit less awkward, I would probably be tempted to experiment around with some of the search terms a little bit more and see if there were words other than nutrition, for instance, that would get me where I wanted to go. Because the, uh, retrieval seems to be a little thin, I mean, there's somewhere between 6 and 9 hits and to do the search properly you'd probably want to experiment around with some of the search terms a little bit more. On the other hand, realizing that it's going to take you 5 to 10 minutes per experiment, or what I perceive as about 5 minutes per experiment, it really doesn't encourage me to play around with the database at all. And I don't sense that, ERIC, I think, uses numeric codes sometimes and online that's a very fast way to get at it, but if you have to seek the entire database going to codes rather than search terms, going to codes rather than search terms is not going to buy you anything. So it may be possible to do the search better in terms of increasing retrieval, but at the cost of spending a whole lot more time futzing with it. OK, looking at the question again, another way to approach it might be, rather than seizing on the terms nutrition and exercise, the, uh, another way, another question

expressed in the statement is, what is the current thinking on teaching young children about nutrition and exercise. And maybe more citations would be retrieved if you used obesity and the idea of education or teaching. In a database like ERIC I think you'd be asking for it to blow up in your face if you just typed in education. Maybe there's a search term in the thesaurus for physical education. *I can't believe he's still formulating more searches. Such a thorough searcher! Tenacious to get many hits even though system is so slow.*

What patience! No, that logic wouldn't get you any more hits than what you've already got because you'd be anding in terms and all that could do is possibly narrow your search. If the citation's going to talk about physical activity or exercise in any way, shape, or form not just in phys ed, and nutrition in any way, shape, or form rather than just nutritional education, adding in terms for obesity and education is just going to narrow it, it's not going to make the, make the search any better as far as retrieval. It would make it better as far as precision, of course. But since the objective here is to get as many citations as possible, we're emphasizing retrieval. OK, there are 7 citations, and let's figure out how to print these. SHOW RECORDS FOUND. Let's see. OK. That one's a good hit. That's a good hit. Yep, they're all good hits, so they're on point.

E *Next Record click to go through hits, but a bit impatient waiting for clock to return to arrow.* Let's see, how do we print these guys? [You can just print the first five.] Print records. OK, I'll save search history. Let's see. Hm. *Chooses Select Fields and changes to all.* The, um, option for selected records is not selectable. Ah. [Ah, what?] Ah, we have to go into retrieved records and print which ones we want to see.

Q *Clicks ? and does move the ? to All Records button.* Select it by clicking on the record number. OK. So, we'll look at the first five. *When paging through, waits patiently for clock.* I'm just paging through and selecting the first five so it will print them. Wait a minute, there you go.

E Now, go back to print records. Search from record. *Trouble remembering where he'd found print command.* Select print records. Selected records, OK. I sent the first five records over to the laser printer. [OK, are you ready to stop?] *After search I asked him to go back to the search history window. With only a little hesitation he clicked the close window box and got back.*

QUESTIONNAIRE COMMENTS: 1. System is way too slow. This can discourage searching by experiment. 2. No "native" or "online" mode for experienced searchers.

Session 9

QR *Glanced at quick reference,*

UM *flipped through manual,*

TH *but checks thesaurus for terms. Looking for help on concepts.*

OK, the first thing I want to do is to become familiar with the information that you've provided here to help me with my search and determine what concepts or terms I should use in my search, because I'm not as familiar with the Mac version of this database. Is it similar to using? Can I ask a question? [I may or may not answer it.] I'm just saying, is it similar to the other? [The CD-ROM is the exact same thing.] So that the search, to search it and everything else is the same? [You may find some differences.] OK. OK, I'm using the thesaurus right now, and I'm looking up the term obesity. OK, it's not here. Now, I'm looking up, I'm trying to determine what, OK, the current thinking on teaching young children, preschool and kindergarten through three. Whether that's primary school or the term for that group would be. OK, I found preschool children, age two to five. Primary education, OK. So I'm going to try the term, um, let's see, preschool and primary and nutrition and exercise. And then primary school. I'm allowed to do a number of searches, right? OK. Primary education and nutrition and exercise. [Tell me what you're typing in.] OK. "Preschool and nutrition", I'm checking here to see if I spelled nutrition right. And exercise.

S+ *Types and vs. clicking it. And just enter it? Oh, OK.*

S+ *Enter vs. Start Search. OK, they're showing the records here for each of my terms. And I've found two records. OK, now, I'm going to look at those records. No trouble with mouse movement. Health practices reported by daycare parents, implications for early childhood educators. Well, that doesn't address the issue of obesity. Let's see what the next record is. OK, now here's one that seems to address. So, do I print it? Is that what the instruction says? [I'd like you to print at least five.] OK, OK. As I choose? OK. Goes immediately to file menu to print.*

E *Selected begin print from record #2. In print dialog box, said to print from page 2 to page 2. Is there any particular way you want it? Separate page? [It's up to you.] [Tell me what you're*

typing in.] OK, what I'm printing? I'm printing an article called ready, set, grow, health education for 3-5 year olds.

N+ *Used down arrow to look at abstract.* OK, the abstract tells me it's intended for use in family, daycare, preschool centers, professional corporations, institutions, and in home. It's a comprehensive health education curriculum for three through five year old children, and contains units designed to sequentially teach concepts about health, mental health, family living and safety. Also deals with nutrition and exercise. OK, I'm going to do another search. [Keep thinking aloud.]

NE OK, I'm trying to figure out how I start another search. OK, so I'm thinking here, should I get help?

Q *Clicked ? to get help on getting back, but re-clicked to get arrow. Checked under File, Edit and Help, then decided to restart session.* If I went restart session, does that get me back to the search, I'm thinking. Now I'm waiting for it to do something. OK, I'm back to that. OK, I'm going to enter another search now, and this one's going to be primary education and nutrition and exercise. So far I'm not coming up with any records for this search. *Search at 8% complete.* I should know better than to use education in ERIC. I'm still not getting any records on this search. *Search 66% complete.* OK, it came up with 2. I'm going to view those now. OK, I've come up with an item called health curriculum guide, grade 1. OK, and the abstract tells me that this is a curriculum guide, supplements the Alabama health education course of study which offers a comprehensive plan, sequential curriculum for grades K-12. OK, I'm going to print this record.

E *Again prints from page 1 to 1, did seem to notice that 2 records formatted, but doesn't comment on it.* OK, now I want to view the next record that this search provided. OK, the title of this one is project hardy heart, a cardiovascular fitness curriculum for first grade children. Now I'm going to view the abstract. This physical education and health education curriculum guide specializes in the healthy heart. Is designed for use by both classroom teachers and physical education teachers. Part one outlines the physical education curriculum for children in first grade. Included are a variety of physical education program activities which focus on improving cardiovascular endurance, enhancing basic motor skill development, increasing levels of strength, flexibility, and balance. It does have an emphasis on exercise and nutrition. I'm going to print this one, too.

- E *Uses same strategy to print this record.* OK, I need to formulate another search here, so I can get as many records as possible on this topic. I think what I'm going to use is a broad term which is early childhood education and these two other terms, nutrition and exercise. Let's see.
- NE *Checks under File and Edit, then Restarts session again.* This time I'm going to use and nutrition or exercise. To broaden my search. OK, I'm entering the search here.
- L *Early childhood education and nutrition or exercise. This is interpreted as (early childhood education and nutrition) or exercise. But window only shows to word nutrition, not the close parentheses. This isn't really the logic she wants.* OK, so far this hasn't found any records. 9% complete, 0 records found. [If you want to try to print just one more I think that would be fine.] OK.
- TH *Appears to wait patiently during search, looks through thesaurus to formulate next search.* While this is doing that, my, if we were having a reference interview, one of the questions that I would ask is that are you also looking for material on theory. And so, I'm wondering if a search on that is necessary, in that area. OK, it's come up with 2111 records. Sigh. OK, the final results are 3113 records. I'm going to narrow this search a bit and do early childhood education and nutrition and exercise. I'm going to now formulate a search for theory. First I think health education. OK, I'm finding health education, nutrition instruction is a term that might apply here. Now I'm looking up theory. OK, um, I believe my search terms are going to be nutrition instruction, um, early childhood education, nutrition instruction, and nutrition instruction. And theories. So far my last search hasn't found any records. OK, one just appeared. OK, 2 records were found. Now I'm going to view those records. OK, the title of the first item is health update, preventing heart disease begins in childhood. The abstract tells me that this article maintains that the prevention of heart disease begins in childhood with good dietary habits and healthcare. Provides parents and childcare professionals with guidelines they can use to help prevent heart disease in children. Well, I think I'm going to look at the next record here. Family health is the title, and it's bilingual. These are booklets on family and child health. This is part of a series of 22 booklets specifically designed to help parents understand their children and help them to learn the effects of stress on family life, covers issues such as the causes and effects of

stress. OK, this doesn't seem to apply to what I'm looking for in terms of classroom education. OK, I'm not going to print either one of these.

NE Oh, did I quit? [Just click on MacSPIRS.] Here? Oh, OK. *Quit instead of Restart Session, by accident? Hoping that was way to get back?* OK, I'm going to enter another search here then. Early childhood education and nutrition instruction and theories. OK, I'm wondering if I should truncate theory.

QR So, I'm looking at the guide to find out about truncation. OK. So, I'm going to truncate theory. Using a star. OK, while this is going on, I'm going to formulate another theory, that is, another search. And that would be preschool, um, primary and preschool and preschool and nutrition instruction. I'm going to change this to primary or preschool. *Change made on paper to search terms just stated. Still searching early childhood education and nutrition instruction and theories.* I'm debating here about whether to make it primary education or leave it primary in this next search.

TH So I'm going to look up in here primary and see if I'd be pulling up a whole lot of things. Primary education. So far I'm not coming up with any records on this search. *79% complete, 0 records.* OK, there were no records found for theories. So I'm going to do one more search here. And I'm going to use primary education or preschool and nutrition instruction. OK, we found one record. [If you want to print one of these when you look at them and then stop that's fine.] OK. OK, we found four records. This search has produced 19 records so far. *I think she's afraid that Break Search will lose records found to this point. I told her to print one, yet she waits patiently for search to complete.* 62 records were found using that search. Now I'm going to view these records. OK, this one, the first one is entitled education for child survival and development in Africa. This is a UN document. I don't think this would be appropriate for what we're looking at unless this person has an international focus. And obviously, well not obviously, but it wouldn't apply to obesity either. The second one is entitled effects of parent augmentation of preschool curriculum in children's knowledge scores. Compared gain scores of one, a group of middle-class children in daycare centers whose parents augment the daycare curriculum at home, two, a group who receives only the daycare curriculum. I don't think this so much applies. Special cooking friend is the second, I mean, the name of the third. Add spice to head start nutrition program.

Describes American Home Economics Association's volunteer nutrition consultant project in which home economists teach, advise, and share their nutrition expertise with Headstart children and families. [Why don't you just print that one?] OK. [I don't mean to rush you, but I think you've done a good job.] OK.

- E *Checks options for print under file menu, still looking discretely for way to narrow printing, and uses same strategy as before..*

QUESTIONNAIRE COMMENTS: None

Session 10

Unfamiliar with the Mac, but he searches for a living. Windows experience.

Concerns about obesity in young people, current thinking on teaching young children, preschool, kindergarten through third grade about nutrition and exercise. Seems like a fairly well-defined search question, which is good because this is not interactive. I couldn't seek further clarification on the question. So, I'll start by familiarizing myself with the database itself. OK.

- S+ I'm not familiar with the Macintosh, I haven't used it before, however, I've used Windows for IBM PCs which is a similar interface, at least it looks it from the outside.
- I I'm just going to read through the introductory information. OK, I've used the ERIC database before for work I've done for library research as well as professional research. OK, enter the search. I think I'll begin with obesity. I guess my initial question would be if I'm able to refine the searches once I begin them, and I'll find out soon enough. *Start search click.* Search is in process, and I spelled obesity wrong. I'll try that again. OK, there are 228 records.
- S+ It looks like I can combine the search number and then use Boolean operators to refine the search. I'll try that. [Tell me what you're typing in.] I'm typing in search number 2 which is obesity and I'm using the Boolean operator and, anding in preschool. *#2 and -- types in and.* A question that comes to mind is if I can use parenthetical refinement I could put, for instance, number 2 and preschool, if I could open a parenthesis and put preschool or kindergarten, that way it would search for number 2 and preschool or kindergarten. I don't know if I can do that. I'm just going to search number 2 and preschool, with preschool being all one word. OK, it looks like the Boolean operator works as I anticipated, and I have a total of four

records showing. The search question asks for, in addition to preschool, kindergarten through third grade. I'll go ahead and try that. I'm searching for obesity, which is search #2 and kindergarten. See what I come up with there. OK, came up with 2 hits. The second part of the question has to do with nutrition and exercise, which may or may not have to do with obesity. I think at this point I'm going to look at a couple of records and see what I'm pulling up. There's also the concept of currency meaning I assume in the last, it's difficult what you mean by current. If I were speaking with someone I would ask them to further define currency because that could be in the last ten years or the last year. So, that's a question that I have. *Experienced searcher looks at currency of info.* I'm going to take it from the last three years. Now, in order to do that I've got to know how to limit by year.

Q I don't know how to do that, but I see a question mark. I'm going to check that out. I'm pushing the question mark, uh, I assume that would be help, but apparently it's not.

E *Fails to deselect ? icon.*

H I'm going to go up to the help screen, to the help pull-down menu. I'm going to the finding records, narrowing a search. OK. *No problem using secondary menus.* I'm apparently in the help menu concerning help because I clicked the question mark. Now I'm going to do it without the question mark and try that. OK. Looking for help on finding records, messed that up again, narrowing a search. What I'm looking for is how to limit by date. OK, first it tells me about Boolean operators or you can search in a particular field, limit fields, language, publication date. OK, that's what I'm looking for. Most databases have specific limit fields, py for publication year, I'm reading from the menu, that you can use with other search terms to focus the search. OK. I don't see a, um, list of those fields. OK, now I'm to, in the help menu, it says searching limit fields. Use in or = to search in this field, so if I wanted to search for publication year I use the prefix py, I'm looking, I want a date range, I think this goes only through 1991, so I'm probably looking for articles from 1989 to 1991, and I'm looking for how to do a date range. I found it, using a hyphen to do date range.

N+ OK, I'm going to exit out of the help menu, I'm going to click a box in the upper left corner which worked, so. OK. Now, going back to my original search, I have 4, possibly 4, or 6 applicable records. I'm going to combine those at this point. #4 or search

#6, that gives me both the articles that had to do with obesity and preschool, and the articles that had to do with obesity and kindergarten combined into one set which gives me six records as expected. I'm still concerned about the nutrition and exercise aspect, and I'm also concerned about the first grade, second grade, third grade. Because I've got preschool and kindergarten and I've got second through third grade yet to look for. For the time being, I'm going to search #7, which is kindergarten and preschool and obesity, and publication year equals, let's go 1988 to 1991. See what we come up with. Search is in process. Um, but I don't come up with any records here. I'll have to approach it from a different way. Or, I could re-interpret current to be the last ten years. Um, I'm just waiting for the search to complete.

RT It's a fairly complicated search as opposed to the searches I was using before so obviously it's taking a longer time. I'm accustomed to using online services which operate faster, which leads to a little frustration when you have to wait on the CD-ROM to look through, but at the same time I realize that it's not costing me money, so which has sort of led to the roundabout approach to this search. I guess in going in to this search, while I'm killing time, I, my objective was not only to answer the research question, but to familiarize myself with the source. If I were paying for it I would have planned the search ahead of time. I also would have spent some time looking through the hardcopy manuals. OK, zero. Search is 99% complete, and it's still looking for records. That's kind of strange. So anyway, I didn't use any of the hardcopy information before using. OK, we've come up with 2 articles. I'm going to look at these articles, see if they are close to what we're looking for. *Finds Show Records Found button without problem.*

N+ OK, I'm using the arrows on the side of the document to look down through. OK, this first one has to do with preschool, um, and the second has to do with preschool nutritional, let's see, OK, I'm actually reading through the abstract to see, I feel that the first record I pulled is applicable. Um, looking at the second record, and I'm looking back at the search question. I'm not sure about the applicability of the second. It seems to focus on low-income, specifically, and I'm not getting the impression from the search question that that would necessarily be applicable. It's possible that it would be helpful. But, it's not an ideal record. I also noticed that, OK, the records

are 1988 and 89 which is a little early, again it depends on how you define current. Sigh, well what I'd like to do at this point, is print out the record that I feel is applicable, and just get it out of the way. Um, I'm not sure that I would do this, and it says to print the first five records. It didn't ask where the record will be printed out, but I imagine it will be printed somewhere. Um, OK. So if I wish to print this record, there's an option for printing records. OK, search number 7, printing record 1.

? OK, I don't understand print records. Cancel and go back. First record, file, print records, OK, I'd like to just select one record to print.

E *Tries to click selected records, but not highlighted.* I accidentally picked choose fields, I didn't want to do that. So, I'm going to cancel. Um, I don't want to print all records, I just want to print record 1 of 2 of search number 7. I don't see how to do that. It looks like it's going to print records 1 and 2 because it says all records. Oh well, I'm not going to get hung up on that, I'll just print that out. OK, I'm assuming that there's a printer hooked up on the other side of the lab somewhere. [Right.] OK, um, what I'd do at this point, I can't figure out how to print the one record, and I don't feel like spending any more time on this, so I'm just going to print both and manually separate the two. Now it's in the process of printing. OK. OK, so I feel like I've received one record that was of use. Now I need to go back in, and I need to find something that has to do with, actually I think I'm going to redo search #7. I'm , redo search #8, which means I'm going to use kindergarten, preschool, obesity. I'm going to go back from 1982 to 88 and see what kinds of records of records are available, just to see what was going up there, preschool and kindergarten. OK. *Easily closes window of retrieved records window to get to search history.* OK. I'm typing in search #7 and 1982 to 87 just to see what kind of records we come up with there. And again, it took a long time last time, it's going to take a long time this time. Sigh. OK. If I wanted to do this quicker, range is too wide, please use a narrower range. Evidently, the software can't handle that, so, I'll use from 1985 to 87.

S- *Range error message. Why? It accepted PY=1988-1991.*

S+ I went in to edit the search, which is sort of a convenient thing, something that you can't do if you're working online. *No problem correcting search.* OK, I'm going to go from 84 to 87.

At this point I'm aware of the length of time that it's taking to *do this*.

- ? If I wanted to, uh, I guess if I were doing this, knowing how it works now, again the range is too wide, which, I'm not certain I'm understanding what that means. I'm assuming it means that the range of dates is too wide, so let's just do 1986 to 87 and see if that works. Maybe I'm not understanding what that means. OK, um, looks like it's not working. Let's just try one year. PY=1986. OK, let's just try 1987. That didn't work. There's an annoying black space, and I don't understand what that is. OK. Um, try the search again. Apparently it could handle that. OK, well that's a limitation, as far as I'm concerned, not being able to search the date range. Um, sigh, OK. So, let's go for a different approach. Again, I'm concerned about first through third grade, so I'm going to type in first grade and number 2. Looking for obesity and first grade. Um, I wonder if there's a term that covers first through third grade, like elementary education or something like that. I guess I could look in the thesaurus while, I'm looking to see if there's any reference to what kind of term I should use to cover first grade, perhaps I'll also look, um, at elementary. Again if I were doing this search and being charged for it, I probably would have looked through the thesaurus first or used an online thesaurus. That's actually something that, something else that I could have done, is checked the online thesaurus, and I'm not sure if there is one. Online thesaurus meaning terms that are indexed.

- TH Uh, I haven't seen any mention of that, I think I'll just continue to look through the hardcopy. *Starts to look for online thesaurus. Moves cursor to file and edit menus, but then stops and goes back to hardcopy.* Um, OK, I'm going to look up elementary. The, um, elementary school children, elementary education, education provided at kindergarten, grade one through six, seven or eight. OK, problem with that is that it includes grades five, six, and seven, which is not listed among the, they only want kindergarten through first grade, so. Elementary education apparently would not work, however, the related terms does list grades one through three, so I'll use that. I'm looking for grade one and obesity. Um, again if I were starting the search over again, or if I'd used this before, I probably would have included all of the terms that I could think of, and, uh, in the first search, and then limit it down from there. That would have significantly reduced the amount

of time it takes, um, but since I didn't know how the system worked, and how it handled Boolean operators, then, uh, I'm using this to learn. Presumably if I were going to use this system again, then the next time I could come in, without having to deal with the lack of knowledge of the interface, and, it does seem fairly straight forward, and if you're just someone who doesn't necessarily search a lot, uh, I think the fact that I have searched before perhaps led me to be overly analytical about the whole thing. Which has caused me to take more time than necessary. I, uh, couldn't find anything in grade one and obesity.

S+ *Also uses return key to start search.* I'm also trying grade two and obesity. It's doing the search. If it's some, I guess, question I would have is, if it's a study, the studies themselves that include grades one through three might not be limited to grades one through three. And it depends on how the ERIC thesaurus is put together whether if it includes all the grades, if they separate the grades out, for instance, if it's a study that includes grades one through six, it, they also indexed, the thesaurus indexed the descriptors by their individual grades also. That's just something I don't know. I assume that they may use the broader term elementary education or something like that, and, uh. OK, we're also not coming up with anything for grades two and number two. It's just a dead end. I'll try grade three and number two.

S+ OK, um, it looks like an interesting aspect of this is the search history, uh, it looks like I can go back and see what I've done before. At this point I'm getting a large number of searches which is, which is really too many to keep track of in my mind. Uh, again, I attribute that to the fact that I haven't used this before. And, in addition to, trying to come up with the answer to the question, I'm also trying to figure out how I would handle my approach to the issue. OK. I'm going to go back, and I'm going to find, uh, OK, preschool, kindergarten, grade one, grade two, and grade three. I'm going to do a comprehensive search, just to include all of those, then I'm going to and in nutrition or exercise, then I'm going to print some records and be done with this. Or that's the plan anyway. Kindergarten or, um, preschool or grade one or grade two or grade three. *When combining searches, he stops at the end of the line instead of continuing to type and letting window move.*

RT Again we run up against the fact that it's a CD-ROM so it takes a long time when you complicate the search. When you're used

to fairly instantaneous results it gets annoying. Especially with a small set of records. ERIC 1982 to 1991, I guess that's actually, there's a large number of records there, but I've searched much larger collections of records much faster and, it gets annoying. I'm also aware that ERIC's available online, free places, which would take less time, and give you a complete set up-to-date. This is September 1991 which, at this point, is a year old, and so I'd have to question the, uh, the currency of the results that I get. OK, um, zillions of records, uh, actually four thousand. And it's lumbering along.

S+ Let's see, interface, I think is, um, it's good that it's telling me what percentage it's finished with the search, lessens the frustration a little bit. [At what point would you consider breaking the search?] Um, I would probably, this is obviously an unwieldy amount of records, but I would like to, if I have all the time that I need, which I do, then there's really no need to break it. I don't know how much nutrition is going to, what I can do at this point is, even if I have ten thousand records or fifteen thousand whatever, I can immediately use 1991 which is going to limit it tremendously, and I can still include all, all the records. By breaking the search, I don't know at what point it's broken the search. For instance, if I knew that it looked at the most recent records first, um, then I'd break the search now, but it's over halfway done. To limit it right off, if I knew what the definition of current was then I could have included that. I could have anded in py=1990, 1989 to 1991, but then I might run into the fact that it can't handle that date range like it told me before which was frustrating. Sigh. So, it seems like a long time, but in reality this whole search is going to take less than two minutes. If I were going to do this by hand, of course, it would take weeks. So, you just have to temper the frustration with that. If I were concerned about time, of course, there are a couple of other ands that I could, that I could and in, I could and in nutrition, I could and in exercise. OK, let's see. 12,000 records, I'm going to take #31, I'm going to and in py=1991. Complex search request, try using clear command in search menu first or simplify search. OK, now that makes me angry.

? Um, I don't know what it means, and I've just spent a lot of time waiting for it to trundle through 12,000 records. And I don't think it's a complicated a search. And I'm not exactly sure what it means by simplifying search. I wonder if I go back in and enter those, all those, if it's going to tell me again

that it's complex after I wait ten minutes for it to go through. Complex search request. Since it's giving me this message, I also wonder if it's actually giving me all the records that are available in kindergarten, preschool, grade one, grade two, and grade three. Um, [indecipherable] I'll try nutrition. Complex search request. Huh. OK. One, two, three, four, five. Five search terms really isn't that complex. *Scrolls left to right to count search terms.* So, nutrition. We'll just go at it from another angle. Nutrition and py=1989. We'll go back to 1988. 1988, 1991. Sigh.

- S- Range is too wide, please use a narrower range. [Try py greater than 1988 or greater than 1987 and see what it does.] OK. PY greater than 1988. Like that? Ah, another thing that might be, OK, that's working. I'm sure I saw that range, and I'm sure I saw that on the help menu. [Well, you used it once.] Yeah. [And it worked.] Right, I think possibly the search history has to be stored somewhere, and possibly the fact that I'm up to 32 searches, it's getting annoyed. Not that I would ever put human traits on a stupid computer. [Right, right.] OK, it's finding some records on nutrition. I guess it's good that I've done this. I'm learning the limitations of the source. Knowing the limitations I probably wouldn't come back and use it again because, um, because I don't exactly know at what point it's going to decide not to respond, it seems to be sporadic on what's acceptable and what's not acceptable for search terms and for date ranges and for that sort of thing. If I'd paid a lot of money for it, I'd probably send it back. Um, the question I always have in doing these searches and receiving errors is asking if I've done something wrong. Um, in this case, I don't think that I have. But there is some sort of limitation on what you can use on date ranges and number of records and, and that I think should be spelled out, especially in the, uh, advertising literature. For instance, I've never had DIALOG tell me that my search strategy was too complicated. I have had other systems tell me that, but ERIC's available on DIALOG. [You're just a complicated kind of guy.] I suppose. I do admit that my approach is a roundabout way. Maybe I was trying, deep down, to see if I could screw up the computer. [And I appreciate that.] I think the, um, desire to break the search increases as the length of time you spend sitting in front of the computer increases. For instance, if I were waiting for this 99% complete to finish up a few minutes ago then I would probably be much more relaxed than I am right now. What I would

want to do if I were satisfied with the searching capabilities, I'd want to go into some of the options at the top of the screen, like the show options and there were several other search options and that would be interesting. I think it's positive that this is available on Macintosh because Macintosh has a reputation for friendliness. Um, I'm not sure if that's true or not, but Apple has worked awful hard to create that, and that means the whole idea of information being accessible to everybody is that much closer. And, most people aren't going to have this complicated of a search. So, probably for, I don't know, 70, 80% of the people who would use this, the, um, they wouldn't run into any problem. I couldn't imagine most people ever piling up 33 searches. OK. Now I'm mad.

S- *Error message after 99% complete for some time.* The range is too wide, please use a narrower range. I'm angry because it told me that after it had searched for five minutes. So, the assumption is, I've got this client that's waiting on me to answer this question, and I've been messing around with this for half an hour, and I can't go to the client and, say, look, I don't like this. So, um. Sigh. I'm looking through, I'm right now contemplating clearing the searches and starting from the top. I assume that the reason it's being so annoying is because I've gotten so many searches. This time I'm going to start with a comprehensive search, limit it by the date, and, uh, print some stuff out. That was the idea I had before, wasn't it? *He does clear searches from search menu, but is so frustrated he doesn't investigate other options.* Preschool or kindergarten. [Forget the date.] OK. [I'll make it easier for you.] Just get the heck out of here. [I don't want you to throw anything through the screen.] I wonder how, if other people ran into these limitations. That would be my question. Or if it's just me. Or do computers just hate me. [Tell me what you're typing in.] I'm typing in the, the grand search. The search that retrieved 12,000 articles, or 12,000 hits. The one that I should have started out with to begin with if I knew the system. Preschool or kindergarten or grade one, oops, I did that wrong. It's a good thing I read that back. Kindergarten or grade one or grade two or grade three. [Check your one over here.] I think my search efficiency goes down after a certain time. OK. Preschool or kindergarten or grade one or grade two or grade three.

S- OK, this time it tells me it's a complex search request from the get go. It's odd that it did the search before. It obviously did it

and stopped and didn't give me the complete. It's bad that it did that before because I could have assumed that it completed the search as it said it did, and, uh, that would have just been wrong. It looked like a very low number, but it didn't tell me that it was too complex of a search before. Um, sigh. Let's see. Erase. Let's, uh, limit it to, simplify the search. Again, I don't think any person that does searching would say that this is a complex search. I know, I just don't think that that qualifies as a complex search. And now, I don't have the excuse of having 33 searches done before. It's just a lousy product. Or, py, OK, I'm going to do preschool or kindergarten and nutrition. We already did obesity. [Print a couple of these records and I'll let you go free.] Thanks. So, while we're waiting for this search to complete, I'm not satisfied with the product, I'm not satisfied with the messages I've received, um, I think that to be an effective product it would have to have a more flexible searching, uh. Actually the searching strategies are available, it's just that it can't do them, so, um. Again, I just tried to or five terms together that were found in the thesaurus and uh, and, I don't consider that complex, and I don't think I'm wrong. I'm going to print out, I'm just going to print out the first four from the file. Print records. Now this is what I didn't understand before. I want to select the records that I want to print. I don't want to print out all 191 records. It says starting printing from record number.

E Well, I'm going to start from 185 or 186 so it will print out 186 through 191. I would like to select records, I don't understand.

Q Let's look at the question mark. Um, prints a record retrieved by the most recent search, prints all records by default if you have not selected a subset of retrieved records by clicking their identifying numbers in the retrieved records window. By clicking their identifying numbers in the retrieved records window. *Does click? and moves it to Selected Records, but doesn't understand.*

? I don't know where the retrieved records window is. Hm, that confuses me. I'm not going to stick around long enough to figure it out. I would have rather had needles shoved into me. [OK, OK, well if you'd rather have that, I'll go to plan B.] Let's see, one copy, pages, and if it starts printing out more than this then we'll shut off the stupid printer. [OK, I think that's fine.]

QUESTIONNAIRE COMMENTS: Frustrated with product. Limitations became evident when multiple search terms were used. Interface

was friendly but misleading; I felt like it didn't do what it was supposed to do.

APPENDIX B SCRIPT

The following script was read to all subjects prior to beginning the search on ERIC:

This information is being read to you so that each participant will receive the same instructions. You will be given a topic for a search on the ERIC CD-ROM on this Macintosh [point to Macintosh]. I have placed several resources here that you may want to use, but you are not required to use them [point out the ERIC Thesaurus and help manuals]. As you search, I would like for you to think-aloud. Tell me what you are thinking, questions that pop into your mind, problems you might foresee, what you are typing in, etc. Try to voice the logic you are using. Your speech will be recorded by this tape recorder [point to recorder]. Also, I will be observing you from this chair [point to chair], and I will be making notes on my observation.

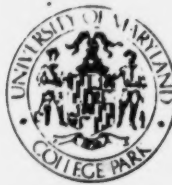
At the conclusion of your search, I will give you a questionnaire to complete. You have the option of taking it on paper or on the Macintosh. You can let me know at that time which is more comfortable for you.

Try to be as relaxed as possible. This is merely an observation. You are in no way being graded or judged on the outcome or timeliness of your search. I assure you of strict confidentiality. The data collected here will not be able to be traced back to you. Should you feel uncomfortable at any time during the search or during the questionnaire, you may stop.

Please feel free to ask any questions you might have before you begin your search. Once your search has begun, I will discourage questions. After your search is completed, you may again ask any questions. Do you have any questions?

APPENDIX C
SITE SOFTWARE LICENSE AGREEMENT FOR QUIS

The following six pages are a copy of the signed Site Software License Agreement. This agreement is between the Human/Computer Interaction Laboratory at the University of Maryland at College Park and the author for the period of 12 months.



UNIVERSITY OF MARYLAND AT COLLEGE PARK

OFFICE OF TECHNOLOGY LIAISON • GRADUATE STUDIES AND RESEARCH

UNIVERSITY OF MARYLAND AT COLLEGE PARK

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Director
Office of Technology Liaison
4312 Knox Road
University of Maryland
College Park, MD 20742

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9. GENERAL

9.1 It is agreed that the laws of the State of Maryland will govern without reference to conflict of law principles. Any and all legal actions must be brought in the courts in the State of Maryland or in the U.S. District Court for the District of Maryland. LICENSEE consents to the jurisdiction of said courts.

9.2 No modification of this Agreement shall be binding unless it is in writing and signed by an authorized representative of the party against whom enforcement of the modification is sought.

9.3 No waiver by either party of any breach of any provision of this Agreement shall constitute a waiver of any other breach of that or any other provision of this Agreement.

- 9.4 Neither this Agreement, the License granted hereby nor any part thereof may be assigned or otherwise transferred by LICENSEE.
- 9.5 Any notices or consents required or permitted under this Agreement shall be in writing and delivered in person or sent by registered or certified mail, return receipt requested, with proper postage affixed, to the addressees set forth in Schedule A unless another address shall have been designated.
- 9.6 In the event that any of the terms of this Agreement is or becomes or is declared to be invalid or void by any court or tribunal of competent jurisdiction, such term or terms shall be null and void and shall be deemed severed from this Agreement, and all the remaining terms of this Agreement shall remain in full force and effect.

LICENSEE ACKNOWLEDGES THAT LICENSEE HAS READ THIS AGREEMENT, UNDERSTANDS IT, AND AGREES TO BE BOUND BY ITS TERMS AND CONDITIONS.

Agreed to:

PATRICIA S. THOMAS

By: [Signature]

Title: _____

Date: July 1 1992

Address: _____

Phone: 410-326-5153

Accepted and Approved:

UNIVERSITY OF MARYLAND AT COLLEGE PARK

By: [Signature]

Title: Director, Technology Liaison

Date: JULY 3 1992

Address: Office of Technology Liaison

4322 Knox Road

University of Maryland

College Park, MD 20742

301-405-4209

APPENDIX D BREAKDOWN OF CODED EVENTS BY SEARCHER

Reference Materials Used

Quick reference card

Searcher	Event
1	what to do when system is searching a long time
1	how to narrow search
2	help with Boolean operators
2,3,3	explanation of abbreviations
3	information on ERIC, citations or actual articles
6,9	just looked at it to see what it was
7	how to limit field (publication year)
9	how to truncate

User manual and Reference guide (binder)

Searcher	Event
1	how to narrow search
1	help with Boolean
2	help on returning to search
2,2,3,9	just looked at it to see what it was

Thesaurus

Searcher	Event
2	just looked at it to see what it was
4,6,8,9	checked for descriptors before searching
5,5,5,7,7,8,9,9,10	checked for descriptors during search
8	checked before searching for age-level descriptor

Help screens

Searcher	Event--Topic selected, purpose
1	Finding records, how to narrow search
1	How to start search
1,2	Guide, how to return to search
1,7	Showing records, how to narrow search
1,7	*Printing records, how to print selected records
1	Show subset, how to print (mouse slipped)
1	*Printing records, how to print
1	Restarting session, stuck in show subset
1	*Showing records, stuck in show subset
2	Narrowing search, how to return to search
2,6	Restarting session, how to return to search

- 3 Getting help, how to print (option w/o 2nd menu)
- 4,4 Printing records, fails to select 2nd menu
- 8 Fields, looking for index
- 10 *Narrowing search. how to limit fields by year
- *The searcher found information here that allowed the completion of the task in question (five events out of total 20).

? icon (context-sensitive help)

- | | |
|----------|----------------------------------|
| Searcher | Event |
| 1 | How to narrow search |
| 4,9 | How to return to search |
| 4,10 | How to print selected records |
| 6 | What to do when search completed |
| 8 | *How to print selected records |
| 10 | How to limit by year |
- *Icon correctly moved to area in question and answer provided to complete the task (1 out of 8 total events).

Introductory screen

- | | |
|------------|--|
| Searcher | Event |
| 1,2,3,8,10 | Yes, read the introductory screen |
| 4,5,6,7,9 | No, did not read the introductory screen |

Macintosh instructions given by author

- | | |
|----------|---|
| Searcher | Event |
| 1,7 | Use of menubar |
| 1 | Close window box |
| 1 | Moving mouse from end of mousepad |
| 1 | How to delete character |
| 1 | Use of button to break search |
| 2 | How to get back into MacSPIRS after system bomb |
| 4 | How to get to help secondary menus |

Index, online

- | | |
|----------|---|
| Searcher | Event |
| 1,2 | Found when exploring to narrow search, used like search dialog box, not helpful |

Exploration of software features

- | | |
|----------|-----------------------------------|
| Searcher | Event |
| 1,2,2,3 | *While trying to return to search |
| 2,2,3 | General exploration of features |
| 1 | *While trying to print |

*Exploration did not provide answers to questions.

Interface issues

System plusses

Searcher	Event
1,1,4,5,6,10	Interchangeability of ENTER and START SEARCH
2,9	Boolean operators: typed
5,8	Boolean operators: clicked
8	Addition of previous number search when new search begun with Boolean operator
2,8	# of previous search typed vs. clicked
10	Ability to edit search as opposed to online
10	% completed message when searching
10	Similarity to Windows
10	Boolean operators on screen a sign that software uses them
10	Availability of search history

System minuses

Searcher	Event
1	Beep, no message. Show Subset selected by mistake and trying to show another record.
1	Beep, no message. Tried to click Selected records when not available as an option.
3	Printer error with number, but no explanation, no indication of what manual might contain it.
4	Beep, no message. Tried entering multiple record numbers in "start printing from record #x" area in print dialog box.
5	Beep, no message. Hit previous record at record #1 to return to search.
7	Message: retrieving records, please wait. No indication of why or % complete. Very slow.
8	System searches for single word posting even though term listed in thesaurus as "young children" (no hyphen).
8	Appears to scan disc for every query, discourages thorough searching, experimentation.
10,10,10	Range error message, even though range used successfully earlier in search. Once message issued when search showed 99% complete.
10	Search request too complex. Five terms used, but those with multiple words not hyphenated.

Intuitive navigation

Searcher	Event
1,6	Toggle of ? icon to get cursor back
1,1,7,9,10	Scrolling page up and down
1,1	Next Record button/Previous Record button
1	Toggle of radio buttons
1	Toggle of selecting records
2	Index, use of scroll right to view entire term
10	Close window box to return to search

Navigational errors

Searcher	Event
1	Attempts to return to search from viewing records
1	By mistake clicks in search window
2	Clicks Previous Record back to #1, thinks index is search window, through help finds "Find Records".
3,3	Tries Previous Record, then by mistake clicks in search window.
4,4,4	Checks under buttons, then restarts session.
5	Checks under buttons, tries previous record until beeps, finally closes window.
7	Clear search.
6,9,9	Clicked ?, looked under menubar, restarts session.
9	Quits application, says it's an accident.

Mouse problems

Searcher	Type of event
1 (14 events)	General lack of hand-eye coordination
2,3,8	Trouble getting to secondary menus in help
7	Initial hesitancy in use

Problems

Errors

Searcher	Event
1,1	Asking to view records before search completed
1	Typing question mark on keyboard for help
1	Typing search word in record
1	Clicking on Boolean operator for help in narrowing a search
1	Typing search phrase in index entry
1,3	Problem deleting with backspace

- 1 Failure to erase selected index terms before selecting new term
- 1 Failure to start search before clicking on show records found
- 1 Retrieving information from incorrect secondary menu in help due to sloppy mouse movement
- 1 Selection of show subset when trying to get selected records to print
- 1 Use of select fields to narrow search
- 1 Back to start search screen but doesn't realize it
- 1 Unintentional mouse click puts word in search box
- 1 Use of Show Subset instead of Start Search
- 1 Clicks on search terms instead of Show Records Found
- 2,2 Extra mouse clicks causing skipped records and system boom
- 2,8 Continuing to click when clock icon showing
- 3 Failure to hit Show Records Found after search complete
- 3 Use of Show Records Found expected to bring up article, not citation
- 3,3,4,5 Printing all records, not selected
- 3,3 Breaking print while formatting
- 3 Click within search history
- 3 Use of Caps Lock to get # sign
- 5 Thought print should have included descriptors
- 5 Not recognizing that citations were retrieved, thinks none because 0 found until last % of search
- 4,5,9,9,9,9 To select records, chose start printing from record # and used LaserWriter dialog box "from page to page" from record to record.
- 7,7,7 Break search saying no records found before search complete
- 8 Trouble remembering where Print Records was
- 8 Looking for index, gives up after checking under help for it.
- 10 Failure to deselect ? icon
- 1,10 Clicks selected records when not highlighted
- 10 Start print from record # fourth from the end to get last four records instead of selecting records.

"I don't understand what this means"

Searcher

Process or terminology not understood

1	Break search
1,4,4	Click on any word or drag across any phrase (search from records)
1	How to narrow search
1,3	Unsure of whether or not it printed
1	Show subset selected, not sure why can't move out of record
3	Error message on using "in" Boolean operator
3	ERIC has citations, not articles
3,3	Abbreviations not obvious
3	Clicking in search history puts terms in search box
3,3,3	Records formatted so far when printing
3,3	How to search, not simple enough
3	Thinks it's printing when it's not
5	Zero records formatted so far
6,8	Not sure whether search complete when it is
10	Print records dialog box
10	Date range too wide
10	Complex search request (should be defined, max # of terms or at least more specific, i.e. use of hyphenated terms)
10	Selected records: retrieved records window

Logic errors

Searcher	Event
1	Selecting help topic not applicable to problem
3	Disinclined to narrow search, pages through 228 records
3	Incorrect use of "in" Boolean operator
3	Doesn't understand difference between child obesity (1 citation retrieved) and childhood obesity (21 retrieved)
3	Assumes all relevant records included under one topic
5,5,5,5,5	Combining search with 0 hits with another search
7,7	Use of term twice in a search
7	Publication year > date of database
9	Problem with Boolean, parentheses needed to correctly interpret

Response time

Searcher	Event
1	Searcher nervous as time lengthens

2,3,3,3	Impatient, extra mouse clicks
2	When printing, assumes user error when "no records formatted so far" appears
7,7,8,8,10,10	Frustration with long search
7	Frustration with length of time to retrieve record